

PROGRAMMABLE CONTROLLER
FP7 TC Multi-analog Input Unit
FP7 RTD Input Unit
User's Manual

Safety Precautions

Observe the following notices to ensure personal safety or to prevent accidents.
To ensure that you use this product correctly, read this User's Manual thoroughly before use.
Make sure that you fully understand the product and information on safety.
This manual uses two safety flags to indicate different levels of danger.

WARNING

If critical situations that could lead to user's death or serious injury is assumed by mishandling of the product.

- Always take precautions to ensure the overall safety of your system, so that the whole system remains safe in the event of failure of this product or other external factor.
- Do not use this product in areas with inflammable gas. It could lead to an explosion.
- Exposing this product to excessive heat or open flames could cause damage to the lithium battery or other electronic parts.

CAUTION

If critical situations that could lead to user's injury or only property damage is assumed by mishandling of the product.

- To prevent excessive exothermic heat or smoke generation, use this product at the values less than the maximum of the characteristics and performance that are assured in these specifications.
- Do not dismantle or remodel the product. It could cause excessive exothermic heat or smoke generation.
- Do not touch the terminal while turning on electricity. It could lead to an electric shock.
- Use the external devices to function the emergency stop and interlock circuit.
- Connect the wires or connectors securely.
The loose connection could cause excessive exothermic heat or smoke generation.
- Do not allow foreign matters such as liquid, flammable materials, metals to go into the inside of the product. It could cause excessive exothermic heat or smoke generation.
- Do not undertake construction (such as connection and disconnection) while the power supply is on. It could lead to an electric shock.

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Introduction

Thank you for buying a Panasonic product. Before you use the product, please carefully read the installation instructions and the users manual, and understand their contents in detail to use the product properly.

Types of Manual

- There are different types of users manual for the FP7 series, as listed below. Please refer to a relevant manual for the unit and purpose of your use.
- The manuals can be downloaded on our website:
http://industrial.panasonic.com/ac/e/dl_center/manual/ .

| Unit name or purpose of use | Manual name | Manual code |
|---|--|----------------|
| FP7 Power Supply Unit | | |
| FP7 CPU Unit | FP7 CPU Unit Users Manual (Hardware) | WUME-FP7CPUH |
| | FP7 CPU Unit Command Reference Manual | WUME-FP7CPUPGR |
| | FP7 CPU Unit Users Manual (Logging Trace Function) | WUME-FP7CPULOG |
| | FP7 CPU Unit Users Manual (Security Function) | WUME-FP7CPUSEC |
| | | |
| Instructions for Built-in LAN Port | FP7 CPU Unit Users Manual (LAN Port Communication) | WUME-FP7LAN |
| Instructions for Built-in COM Port | FP7 series Users Manual (SCU communication) | WUME-FP7COM |
| FP7 Extension Cassette (Communication) (RS-232C/RS485 type) | | |
| FP7 Extension Cassette (Communication) (Ethernet type) | FP7 series Users Manual (Communication cassette Ethernet type) | WUME-FP7CCET |
| FP7 Extension (Function) Cassette Analog Cassette | FP7 Analog Cassette Users Manual | WUME-FP7FCA |
| FP7 Digital Input/Output Unit | FP7 Digital Input/Output Unit Users Manual | WUME-FP7DIO |
| FP7 Analog Input Unit | FP7 Analog Input Unit Users Manual | WUME-FP7AIH |
| FP7 Analog Output Unit | FP7 Analog Output Unit Users Manual | WUME-FP7AOH |
| FP7 Thermocouple Multi-analog Input Unit | FP7 Thermocouple Multi-analog Input Unit FP7 RTD Input Unit Users Manual | WUME-FP7TCRTD |
| FP7 RTD Input Unit | | |
| FP7 High-speed counter Unit | FP7 High-speed counter Unit Users Manual | WUME-FP7HSC |
| FP7 Pulse Output Unit | FP7 Pulse Output Unit Users Manual | WUME-FP7PG |
| FP7 Positioning Unit | FP7 Positioning Unit Users Manual | WUME-FP7POSP |
| FP7 Serial Communication Unit | FP7 series Users Manual (SCU communication) | WUME-FP7COM |
| PHLS System | PHLS System Users Manual | WUME-PHLS |
| Programming Software FPWIN GR7 | FPWIN GR7 Introduction Guidance | WUME-FPWINGR7 |

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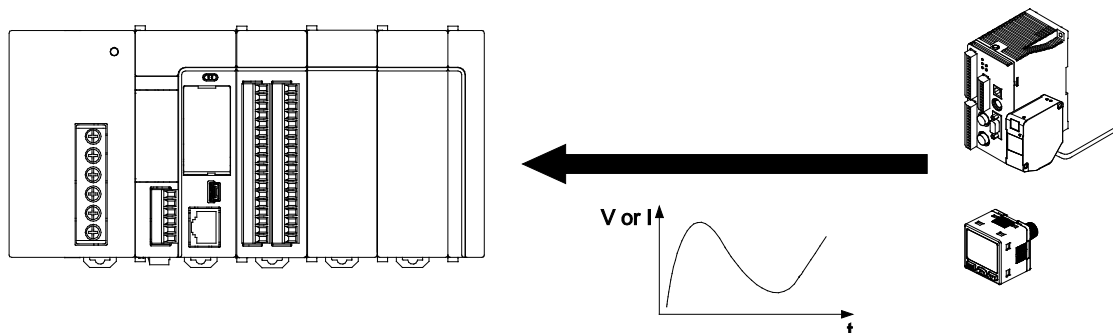
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1

Unit Functions and Restrictions

1.1 Unit Functions and How They Work

1.1.1 Functions of Unit



■ **Analog input control is available in combination with the CPU unit.**

- Temperature data measured by a thermocouple or resistance temperature detector (RTD) is converted as digital values.

■ **Input with simple programs**

- For input data, digital conversion values are read as input devices (WX).
- At the time of the thermocouple input or the RTD input, temperatures are read as integer values in units of 0.1 degrees.

■ **Ten types of thermocouples and three types of RTDs are supported for each channel.**

- Ten types of thermocouples (K, J, T, N, R, S, B, E, PLII and WRe5-26) and three types of RTDs (Pt100, JPt100 and Pt1000) can be used. Also, on the thermocouple multi-analog input unit, they can be used in combination with voltage and current inputs.
- Types of temperature sensors can be changed by the settings of tool software or user programs.

■ Various optional settings

Functions to process loaded analog input data are provided. User programs can be simplified.

| Function | Specifications |
|--|--|
| Average processing setting | Averages analog values obtained by sampling and stores them in the I/O area as digital values. It can be selected from No. of averaging times, time average and moving average. |
| Offset/Gain processing setting | Performs the correction of offset values (addition correct) or gain values (magnification correction), and stores the data after processing in the I/O area. |
| Scale conversion setting | (Only the voltage and current ranges of the thermocouple multi-analog input unit) The function makes it possible to convert values to an easy-to-use data range. Analog input data acquired in a range between preset minimum and maximum values is scale converted and stored in the I/O area. This function is convenient if used for scale unit conversion. |
| Upper/lower limit value comparison setting | This function compares acquired data with the upper limit and lower limit and turns ON the upper limit relay or lower limit relay if the acquired data exceeds the upper limit value or lower limit value. |
| Max./Min. hold setting | This function maintains the maximum and minimum values of acquired data. Holds the maximum and minimum digital conversion values when the maximum/minimum value hold setting is enabled, and stores the values in provided unit memories for each channel. |
| Disconnection detection | (Thermocouple multi-analog input unit) Turns ON the disconnection detection flag when input is disconnected or unconnected when selecting the thermocouple or the range of 1-5 V 4-20 mA, and warns of the error state. Also, in case of thermocouple, converts values to digital values in the range (K30000) which are different from those normally converted. |
| | (RTD input unit) When the A terminal and b terminal or B terminal and b terminal are disconnected, converts values to digital values in the range (K30000) which are different from those normally converted, and warns of the error state. |

1.1.2 Unit Type and Product Number

| Name | Specifications | | Product No. |
|--------------------------------------|----------------|---|-------------|
| Thermocouple multi-analog input unit | 8-ch input | Thermocouple input range: K1, K2, J1, J2, T, N, R, S, B, E, PL II, WRe5-26 Voltage input range: -10 to +10 V, 0 to +5 V, 1 to +5 V, -100 to +100 mV Current input range: 0 to +20 mA, 4 to +20 mA | AFP7TC8 |
| RTD input unit | 8-ch input | RTD input range Pt100-1, Pt100-2, JPt100-1, JPt100-2, Pt1000 | AFP7RTD8 |

1.2 Restrictions on Combinations of Units

1.2.1 Restrictions on Power Consumption

The internal current consumption of the unit is as follows. Make sure that the total current consumption is within the capacity of the power supply with consideration of all other units used in combination with this unit.

| Name | Product No. | Consumption current |
|--------------------------------------|-------------|---------------------|
| Thermocouple multi-analog input unit | AFP7TC8 | 80 mA or less |
| RTD input unit | AFP7RTD8 | 65 mA or less |

1.2.2 Applicable Versions of Unit and Software

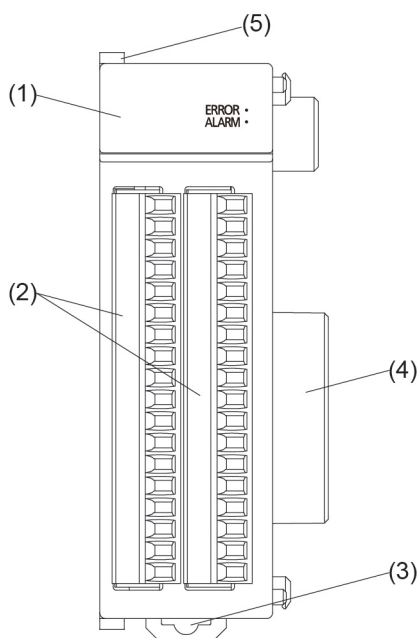
For using the above function cassettes, the following versions of unit and software are required.

| Item | Applicable version |
|---------------------------------------|--------------------|
| FP7 CPU unit | Ver.2.0 or later |
| Programming tool software FPWINGR7 | Ver.2.2 or later |

2

Names and Functions of Parts

2.1 Thermocouple Multi-analog Input Unit and RTD Input Unit



■ Names and Functions of Parts

(1) Operation monitor LEDs

| LED name | LED color | Contents |
|----------|-----------|---|
| - | Blue | Lit when the CPU unit is turned ON. |
| ERROR | Red | Lit when the configuration settings are beyond the allowable range or A/D conversion is not possible. |
| ALARM | Red | Lit when the hardware has an error. |

(2) Analog input terminal block

The terminal block is removable. Remove the terminal block before wiring.

(3) DIN rail attachment lever

This lever is used to fix the unit to the DIN rail.

(4) Unit connector

Connects to other I/O units and highly-functional units.

(5) Fixing hook

This hook is used to secure the unit with another unit.

3

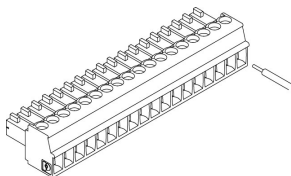
Wiring

3.1 Wiring of Terminal Block

3.1.1 Terminal Block, Suitable Wires and Tools

■ Supplied terminal block and suitable wires

A screw-down connection type is used for the terminal block. Use the following suitable wires for the wiring.



Terminal block socket

| No. of pins | Phoenix Contact model No. | |
|-------------|---------------------------|-------------|
| | Part number | Product No. |
| 18 pins | MC1,5/18-ST-3,5BK | 1840528 |

Suitable wires (strand wire)

| No. of wires | Size | Nominal cross-sectional area |
|--------------|--------------|--|
| 1 | AWG#28 to 16 | 0.08 mm ² to 1.25 mm ² |
| 2 | AWG#28 to 20 | 0.08 mm ² to 0.5 mm ² |

Pole terminals with compatible insulation sleeve

If a pole terminal is being used, the following models (made by Phoenix Contact) should be used.

| Manufacturer | Cross-sectional area | Size | Phoenix Contact Par No. | |
|-----------------|------------------------|----------|-------------------------|---------------------------|
| | | | With insulating sleeve | Without insulating sleeve |
| Phoenix Contact | 0.25 mm ² | AWG#24 | AI 0,25-6 BU | A 0,25-7 |
| | 0.34 mm ² | AWG#22 | AI 0,34-6TQ | A 0,34-7 |
| | 0.50 mm ² | AWG#20 | AI 0,5-6 WH | A 0,5-6 |
| | 0.75 mm ² | AWG#18 | AI 0,75-6 GY | A 0,75-6 |
| | 1.00 mm ² | AWG#16 | - | A 1-6 |
| | 0.5 mm ² ×2 | AWG#20×2 | AI-TWIN 2X 0,5-8 WH | - |

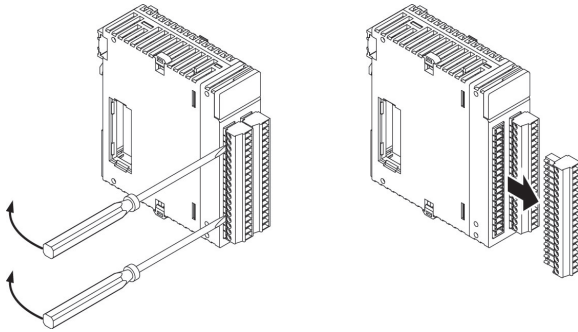
Pressure welding tool for pole terminals

| Manufacturer | Phoenix Contact model No. | |
|-----------------|---------------------------|-------------|
| | Part number | Product No. |
| Phoenix Contact | CRIMPFOX 6 | 1212034 |

3.1.2 Wiring

■ Wiring method

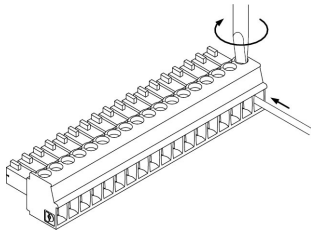
(1) Insert a screwdriver between the terminal block and the case, and remove the terminal block.



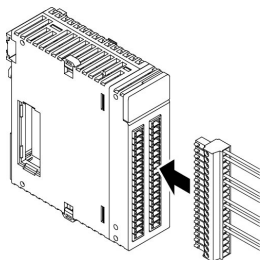
(2) Remove a portion of the wire's insulation.



(3) Insert the wire into the terminal block until it contacts the back of the block socket, and then tighten the screw clockwise to fix the wire in place.



(4) Fit the terminal block into the unit securely.



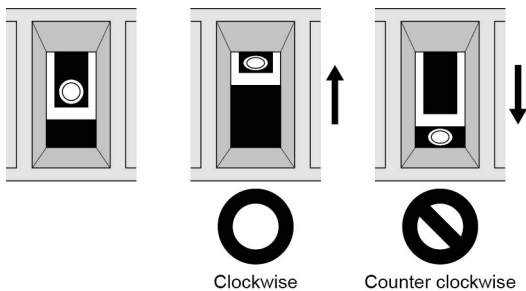
■ Tightening the terminal block

- When tightening the terminals of the terminal block, use a screwdriver (Phoenix Contact, Product No. 1205037) with a blade size of 0.4 x 2.5 (Part No. SZS 0,4x2,5).
- The tightening torque should be 0.22 to 0.25 N·m.

■ Precautions on wiring

The following precautions should be observed, to avoid broken or disconnected wires.

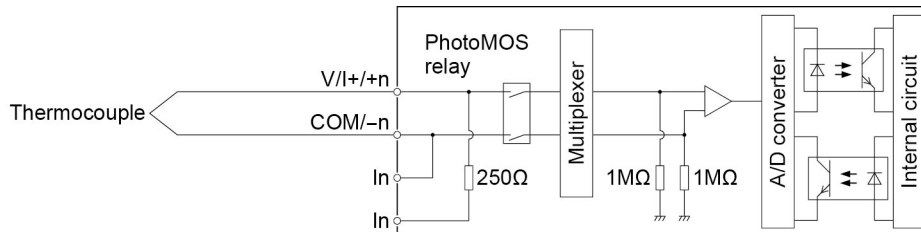
- When removing the wire's insulation, be careful not to scratch the core wire.
- Do not twist the wires to connect them.
- Do not solder the wires to connect them. The solder may break due to vibration.
- After wiring, make sure stress is not applied to the wire.
- In the terminal block socket construction, if the wire is fastened upon counter-clockwise rotation of the screw, the connection is faulty. Disconnect the wire, check the terminal hole, and then re-connect the wire.



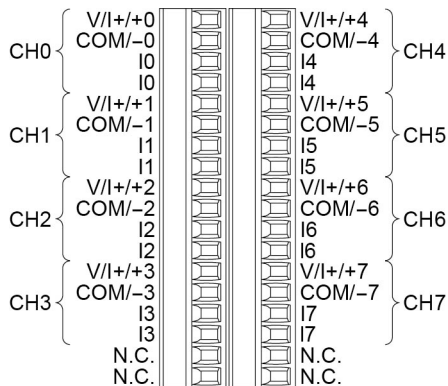
3.2 Connection of Thermocouple Multi-analog Input Unit

3.2.1 For Thermocouple Input

■ Wiring Diagram and Internal Circuit Diagram



■ Terminal layout



(Note) Do not connect anything to N.C. terminals.

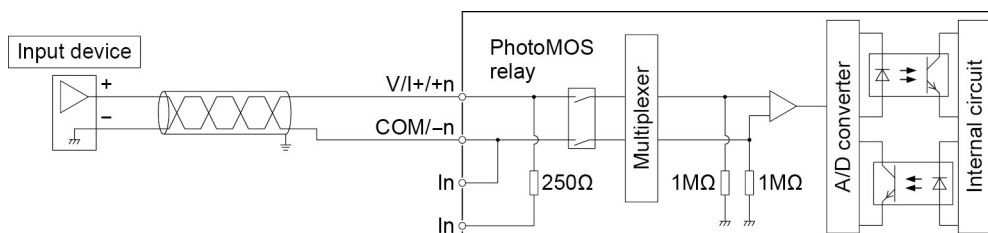


◆ NOTES

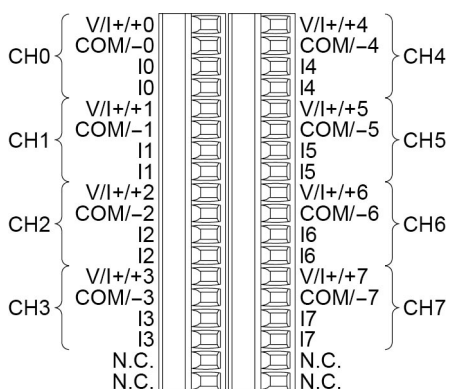
- Connect wires in accordance with the polarity of the thermocouple. Also, when extending the signal line of the thermocouple, use the compensating lead wire for the used thermocouple. It is recommended to ground the unit using the shielded compensating lead wire.
- Do not have the analog input wiring close to AC wires, power wires, or load line from a device other than PLC. Also, do not bundle it with them.

3.2.2 For Voltage Input

■ Wiring Diagram and Internal Circuit Diagram



■ Terminal layout



(Note) Do not connect anything to N.C terminals.



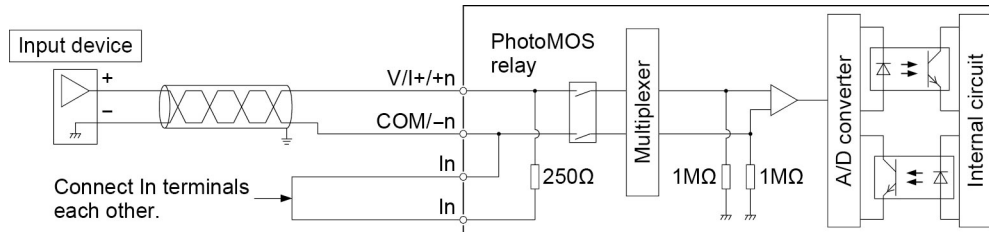
◆ NOTES

- Use double-core twisted-pair shielded wires. It is recommended to ground them. However, depending on the conditions of the external noise, it may be better not to ground the shielding.
- Do not have the analog input wiring close to AC wires, power wires, or load line from a device other than PLC. Also, do not bundle it with them.

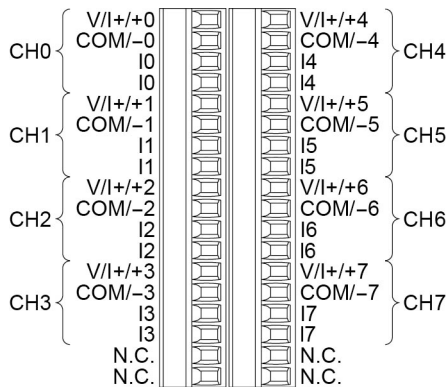
3.2.3 For Current Input

■ Wiring Diagram and Internal Circuit Diagram

In case of the current input, connect In terminals each other.



■ Terminal layout



(Note) Do not connect anything to N.C terminals.

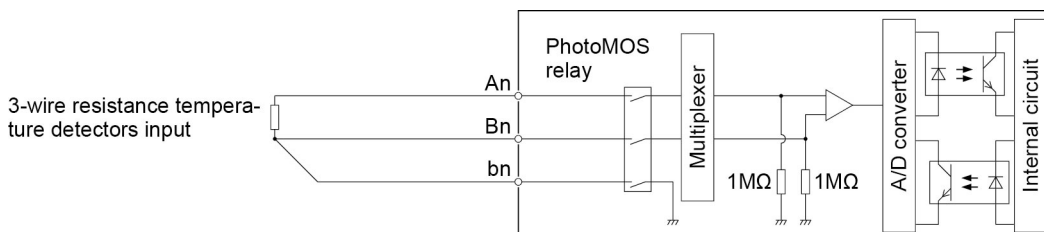


◆ NOTES

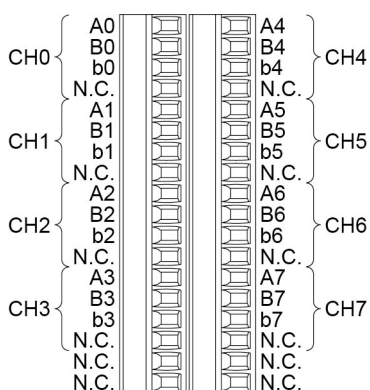
- Use double-core twisted-pair shielded wires. It is recommended to ground them. However, depending on the conditions of the external noise, it may be better not to ground the shielding.
- Do not have the analog input wiring close to AC wires, power wires, or load line from a device other than PLC. Also, do not bundle it with them.

3.3 Connection of RTD Input Unit

■ Wiring Diagram and Internal Circuit Diagram



■ Terminal layout



(Note) Do not connect anything to N.C terminals.



◆ NOTES

- For copper wires for wiring, use thick wires having insulation performance of JISC3307 and JISC3401 or equivalents to prevent a large increase in the electric resistance. It is recommended to ground the unit using the shielded compensating lead wire.
- Do not have the analog input wiring close to AC wires, power wires, or load line from a device other than PLC. Also, do not bundle it with them.

4

Unit Settings and Data Reading

4.1 Confirming the I/O Number Allocations and Starting Word Number

4.1.1 Occupied I/O Area and I/O Allocation

- Input data is allocated to the external input relay areas (WX).
- To the I/O areas of the thermocouple multi analog input unit and RTD input unit, an area to set optional functions and an area to reset errors are allocated.

■ Input contact

| I/O area No. | Name | Default | Description |
|--------------|----------------------------|---------|---|
| WX0 | CH0 Analog conversion data | K0 | <p>Analog conversion data area Digital conversion values corresponding to analog input are stored as 16-bit signed integer data. Stored values vary by ranges. When optional average processing, scale conversion, offset/gain processing has been set, data after the processing is stored.</p> <p>Optional function flag area Refer to the next page.</p> |
| WX1 | CH0 Optional function flag | H0 | |
| WX2 | CH1 Analog conversion data | K0 | |
| WX3 | CH1 Optional function flag | H0 | |
| WX4 | CH2 Analog conversion data | K0 | |
| WX5 | CH2 Optional function flag | H0 | |
| WX6 | CH3 Analog conversion data | K0 | |
| WX7 | CH3 Optional function flag | H0 | |
| WX8 | CH4 Analog conversion data | K0 | |
| WX9 | CH4 Optional function flag | H0 | |
| WX10 | CH5 Analog conversion data | K0 | |
| WX11 | CH5 Optional function flag | H0 | |
| WX12 | CH6 Analog conversion data | K0 | |
| WX13 | CH6 Optional function flag | H0 | |
| WX14 | CH7 Analog conversion data | K0 | |
| WX15 | CH7 Optional function flag | H0 | |

(Note 1): The I/O numbers in the table indicates offset addresses. The I/O numbers actually allocated are the numbers based on the starting word number allocated to the unit. Example) When the starting word number for the unit is "10", the A/D conversion data of CH0 is WX10 and the error flag is X11F.

■ Input contact (Optional functions/Error flag area)

| I/O number | | | | | | | | Name | Description |
|------------|------------|------------|------------|------------|--------------|--------------|--------------|---|---|
| CH0 | CH1 | CH2 | CH3 | CH4 | CH5 | CH6 | CH7 | | |
| X10 | X30 | X50 | X70 | X90 | X110 | X130 | X150 | Disconnection detection flag | ON with disconnection detected and OFF with disconnection restored. (Valid for thermocouple, voltage:1-5 V and current: 4-20 mA ranges only) |
| X11 | X31 | X51 | X71 | X91 | X111 | X131 | X151 | Upper limit comparison relay | Turns ON when the value exceeds the set upper limit. |
| X12 | X32 | X52 | X72 | X92 | X112 | X132 | X152 | Lower limit comparison relay | Turns OFF when the value drops below the set lower limit. |
| X13 | X33 | X53 | X73 | X93 | X113 | X133 | X153 | Upper/Lower limit comparison execution flag | Turns ON when the upper limit/lower limit comparison function is executed. |
| X14 | X34 | X54 | X74 | X99 | X114 | X134 | X154 | Not used | Do not use. |
| X15 | X35 | X55 | X75 | X95 | X115 | X135 | X155 | Max./Min. hold execution flag | Turns ON when the max./min. hold function is executed. |
| X16 to X1E | X36 to X3E | X56 to X5E | X76 to X7E | X96 to X9E | X116 to X11E | X136 to X13E | X156 to X15E | Not used | Do not use. |
| X1F | X3F | X5F | X7F | X9F | X11F | X13F | X15F | Error flag | Turns ON when an error occurs |

(Note 1): The I/O numbers in the table indicates offset addresses. The I/O numbers actually allocated are the numbers based on the starting word number allocated to the unit. Example) When the starting word number for the unit is "10", the C error flag is X11F.

■ Output flag

| I/O number | | | | | | | | Name | Description |
|------------|------------|------------|------------|------------|------------|------------|------------|--|--|
| CH0 | CH1 | CH2 | CH3 | CH4 | CH5 | CH6 | CH7 | | |
| Y0 | Y10 | Y20 | Y30 | Y40 | Y50 | Y60 | Y70 | Disconnection detection execution relay | ON to execute the disconnection detection function. OFF to turn OFF the disconnection detection flag (Xn0). (Valid for thermocouple, voltage:1-5 V and current: 4-20 mA ranges only) |
| Y1 | Y11 | Y21 | Y31 | Y41 | Y51 | Y61 | Y71 | Not used | Do not use. |
| Y2 | Y12 | Y22 | Y32 | Y42 | Y52 | Y62 | Y72 | | |
| Y3 | Y13 | Y23 | Y33 | Y43 | Y53 | Y63 | Y73 | Upper/Lower limit comparison execution relay | ON to execute the function to compare the upper and lower limits. OFF to turn OFF the upper limit comparison relay (Xn1) and lower limit comparison relay (Xn2). |
| Y4 | Y14 | Y24 | Y34 | Y44 | Y54 | Y64 | Y74 | Not used | Do not use. |
| Y5 | Y15 | Y25 | Y35 | Y45 | Y55 | Y65 | Y75 | Max./Min. hold execution relay | ON to execute the max./min. hold function. |
| Y6 to YE | Y16 to Y1E | Y26 to Y2E | Y36 to Y3E | Y46 to Y4E | Y56 to Y5E | Y66 to Y6E | Y76 to Y7E | Not used | Do not use. |
| YF | Y1F | Y2F | Y3F | Y4F | Y5F | Y6F | Y7F | Error flag reset relay | Resets an error flag. |

(Note 1): The I/O numbers in the table indicates offset addresses. The I/O numbers actually allocated are the numbers based on the starting word number allocated to the unit. Example) When the starting word number for the unit is "10", the disconnection detection execution relay of CH0 is Y100, and the error flag reset relay is Y10F.

4.1.2 Confirming Allocation of I/O Numbers

- The I/O numbers and base word numbers are always necessary when creating programs. Always check to see if the numbers match the design.
- The I/O numbers allocated to the analog input unit are determined by the starting word numbers.

■ Allocation method

Take the following procedure to set the starting word number.



◆ PROCEDURE

1. Select "Options" > "FP7 Configuration" in the menu bar.
2. Select "I/O map" in the field.
3. Double-click the target slot where the operating unit is to be inserted.
4. Select "Thermocouple Multi-analog Input Unit" or "RTD Input Unit" in the field of "Select unit to use".
5. Press the [OK] button.

The specified starting word number is set.

4.2 Configuration Settings

4.2.1 Unit Configuration

The settings for the unit such as input range, channels to be converted and optional functions are specified in the configuration menu of tool software.

■ Setting method

The following procedure describes the process when the thermocouple multi-analog input unit or RTD input unit has been already allocated in the I/O map.



◆ PROCEDURE

1. **Select "Options" > "FP7 Configuration" in the menu bar.**
2. **Select "I/O Map" in the field.**
3. **Select the slot where the unit has been registered, and press the "Advanced" button.**

"Thermocouple multi-analog input unit" or "RTD input unit" setting dialog box is displayed.

4. **Select items according to the conditions used.**

Select optional settings as necessary.

5. **Press the [OK] button.**

The set values will be effective when they are downloaded with programs as a project.

■ Settings

| Group | Setting item | | Settings | Default |
|---------------------------------------|--------------------------|--------------|---|------------------------------|
| Basic setting item (Common) | Power frequency | | 60Hz/50Hz | 60 Hz |
| | Conversion time (Note) | | 25ms/5ms | 25 ms |
| Basic setting item (for each channel) | Conversion processing | | Execute/Not execute | Execute |
| | Range setting (TC unit) | Thermocouple | K1 (-100.0 to 600.0 °C) K2 (-200.0 to 1000.0 °C) J1 (-100.0 to 400.0 °C) J2 (-200.0 to 750.0 °C) T (-270.0 to 400.0 °C) N (-270.0 to 1300.0 °C) R (0.0 to 1760.0 °C) S (0.0 to 1760.0 °C) B (0.0 to 1820.0 °C) E (-270.0 to 1000.0 °C) PL II (0.0 to 1390.0 °C) WRe5-26 (0.0 to 2315.0 °C) | -10 to +10 V |
| | | Voltage | -10 to +10 V 0 to +5 V +1 to +5 V -100 to +100 mV | |
| | | Current | 0 to +20 mA +4 to +20 mA | |
| | Range setting (RTD unit) | | Pt100-1 (-100.0 to 200.0 °C) Pt100-2 (-200.0 to 650.0 °C) JPt100-1 (-100.0 to 200.0 °C) JPt100-2 (-200.0 to 650.0 °C) Pt1000 (-100.0 to 100.0 °C) | Pt100-1 (-100.0 to 200.0 °C) |

(Note) Conversion time can be set only when selecting the thermocouple multi-analog input unit.

■ Settings

| Group | Setting item | Settings | Default |
|--|--|--|-------------|
| Optional setting item (For each CH) | Average processing settings | Not execute/No. of averaging times/Time average/Moving average | Not execute |
| | Offset/Gain processing | Not execute/Execute | Not execute |
| | Scale conversion(Note) | Not execute/Execute | Not execute |
| | Upper/Lower limit comparison | Not execute/Execute | Not execute |
| | Max./Min. hold | Not execute/Execute | Not execute |
| | Disconnection detection | Not execute/Execute | Not execute |
| | Disconnection detection reset | Auto/Manual | Auto |
| | Averaging constant | No. of times: 2 to 60000 [times] | 8 |
| | | Time: 200 to 60000 [ms] | 200 |
| | | Moving: 3 to 64 [times] | 8 |
| | Offset value | -3000 to +3000 | 0 |
| | Gain value | +9000 to +11000 | +10000 |
| | Maximum value of scale conversion (Note) | -30000 to +30000 | +10000 |
| | Minimum value of scale conversion (Note) | -30000 to +30000 | 0 |
| | Upper limit comparison ON level | -31250 to +31250 | +1000 |
| | Upper limit comparison OFF level | -31250 to +31250 | +1000 |
| | Lower limit comparison ON level | -31250 to +31250 | 0 |
| | Lower limit comparison OFF level | -31250 to +31250 | 0 |

(Note) Scale conversion can be set only when selecting voltage or current range in the thermocouple multi-analog input unit.

4.2.2 Unit Setting and Conversion Processing Time

Conversion time varies with the configuration setting conditions.

■ Unit's conversion process cycle time

- The unit's conversion time is determined by the number of channels that the conversion process is executed.
- For the thermocouple multi-analog input unit, a conversion time per channel can be selected.

| Normal mode (When conversion time is 25 ms/ch) | | High-speed mode (When conversion time is 5 ms/ch) (Note 2) | |
|---|-----------------------------------|---|-----------------------------------|
| No. of executed channels (Note 1) | Conversion time + Processing time | No. of executed channels (Note 1) | Conversion time + Processing time |
| 1 | 25 ms + 25 ms | 1 | 5 ms + 5 ms |
| 2 | 50 ms + 25 ms | 2 | 10 ms + 5 ms |
| 3 | 75 ms + 25 ms | 3 | 15 ms + 5 ms |
| 4 | 100 ms + 25 ms | 4 | 20 ms + 5 ms |
| 5 | 125 ms + 25 ms | 5 | 25 ms + 5 ms |
| 6 | 150 ms + 25 ms | 6 | 30 ms + 5 ms |
| 7 | 175 ms + 25 ms | 7 | 35 ms + 5 ms |
| 8 | 200 ms + 25 ms | 8 | 40 ms + 5 ms |

(Note 1) Channels to execute the conversion processing are set in the unit memories (UM00080/UM00090/UM000A0/UM000B0/UM000C0/UM000D0/UM000E0/UM000F0).

(Note 2) Conversion time can be set only when selecting the thermocouple multi-analog input unit. It is set in the unit memory (UM00071).

■ Normal mode and High-speed mode

- In the normal mode (conversion time: 25 ms/c), a process is available to reduce the effects of commercial frequency (50Hz/60Hz) noises by a digital filter. In the high-speed mode (conversion time: 5 ms/ch), this process is not available.
- When there are effects of commercial frequency (50Hz/60Hz) noises, it is recommended to use the normal mode.

■ Conversion processing execution/non-execution setting and conversion processing time

Select the execution or non-execution of the conversion processing of analog input on a channel-by-channel basis. This can save the conversion time for channels that do not execute conversion processing.

Example) Conversion time for two channels (with CH2 to CH7 excluded)

Conversion is executed in the order of ch0→ch1→ch0→ch1→ch0→ch1→ch0→ch1→..., and the conversion time for CH2 to CH7, which are excluded, is saved.

4.3 Reading Analog Input Data

4.3.1 Reading Analog Input Data

■ Basic operation of analog input processing

(1) Receiving analog input

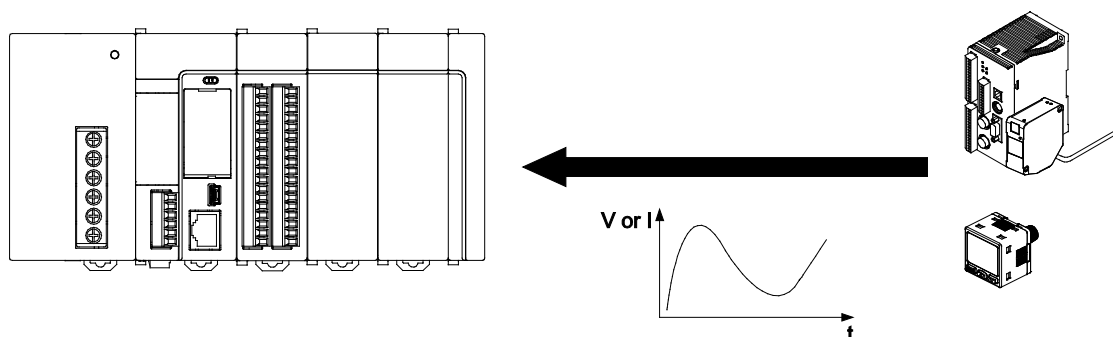
The input part of the unit receives analog input data from the thermocouple, RTD or external devices.

(2) Digital conversion processing

Analog input data received by the unit is converted into digital values in sequence automatically in the unit. The converted digital value varies with the setting of the range.

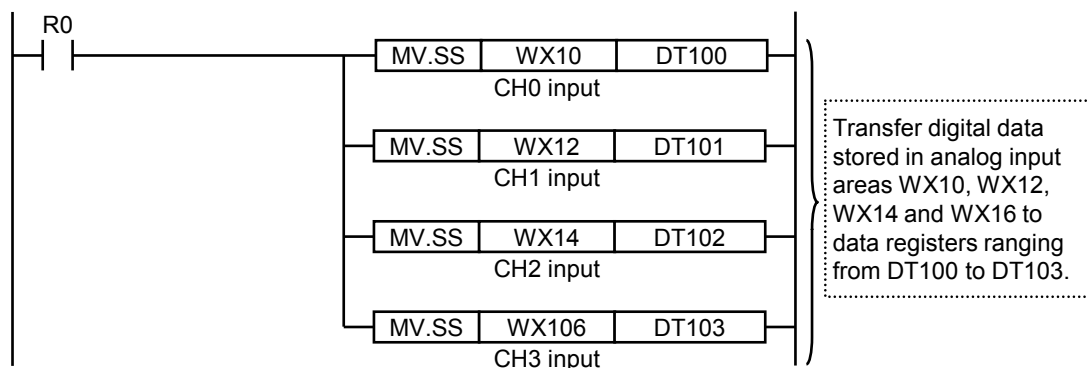
(3) Storage of digital values

A user program is used to read converted digital values as data in the unit relay area (WX). The specified area number varies depending on the installation position of the unit.



■ Program to acquire converted digital values

Reading the values in digital conversion value storage areas WX10, WX12, WX14, and WX16 to any areas of data registers ranging from DT100 to DT103.



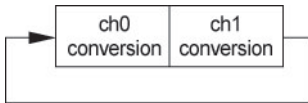
4.4 Data Acquisition Timing

■ Input conversion processing time of the unit

Conversion processing time varies with the range and the number of channels in use. The conversion execution/non-execution channel function can save the conversion time for channels that do not execute conversion processing.

Example of 2-channel conversion

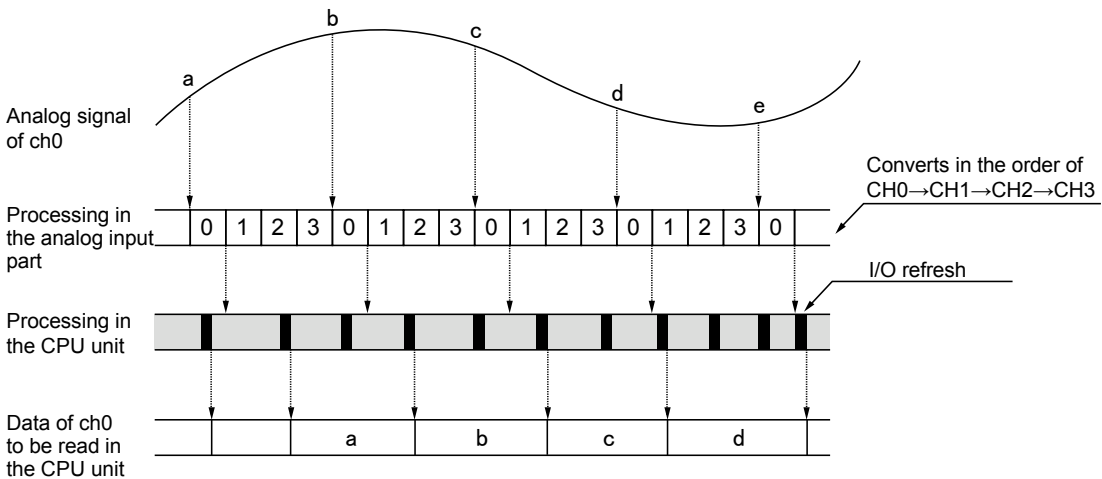
Converted in the order of ch0→ch1→ch0→ch1→...

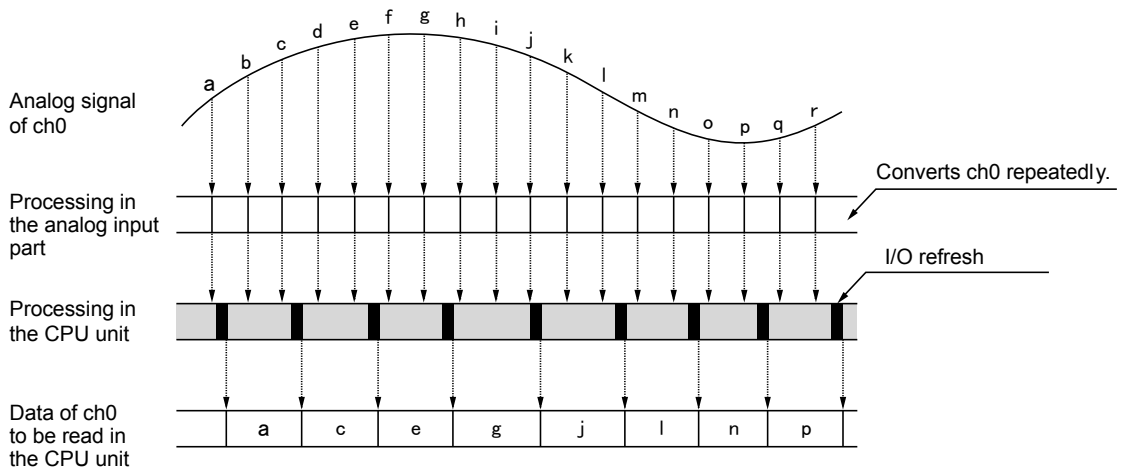


■ Data acquisition timing of CPU unit

- Digital values converted by the unit are input into the CPU unit at the I/O refreshing timing of the CPU unit.
- The conversion processing of the analog input unit is not synchronized with the I/O refreshing timing of the CPU unit. Therefore, the latest data is input into the operation memory of the CPU unit when the CPU unit implements I/O refreshing.

Example of 4-channel conversion



Example of 1-channel conversion

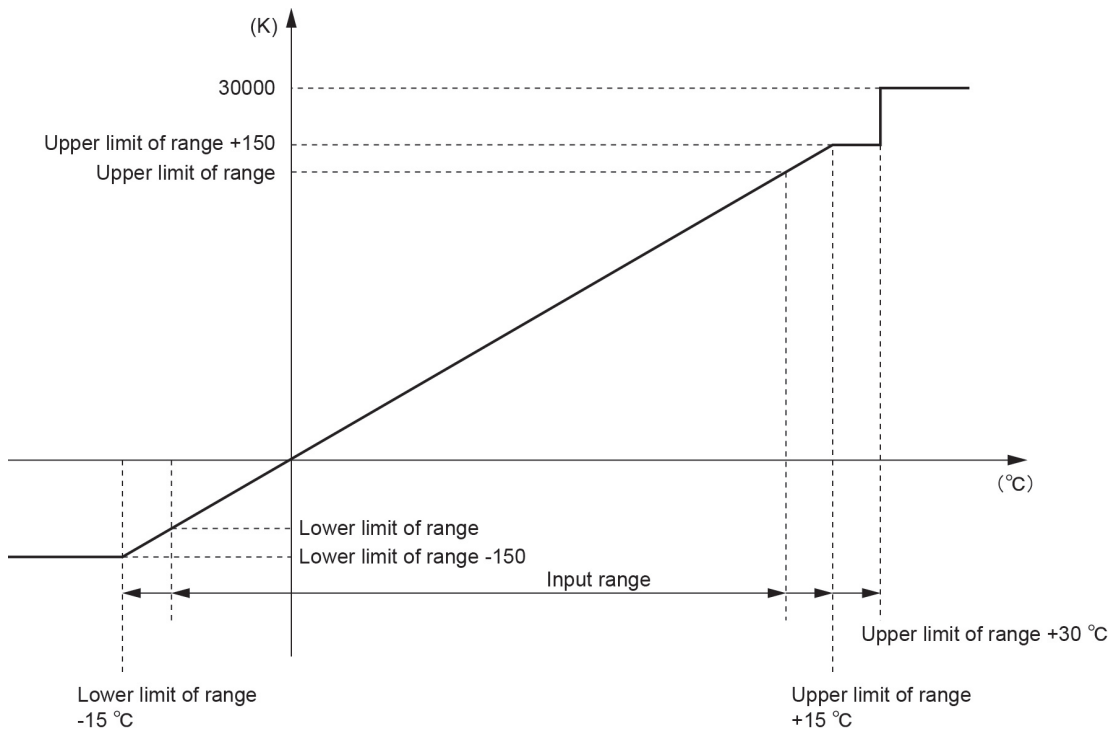
5

Conversion Characteristics of Analog Input

5.1 Input Conversion Characteristics (AFP7TC8)

5.1.1 Thermocouple Input Range

■ Conversion characteristics graph



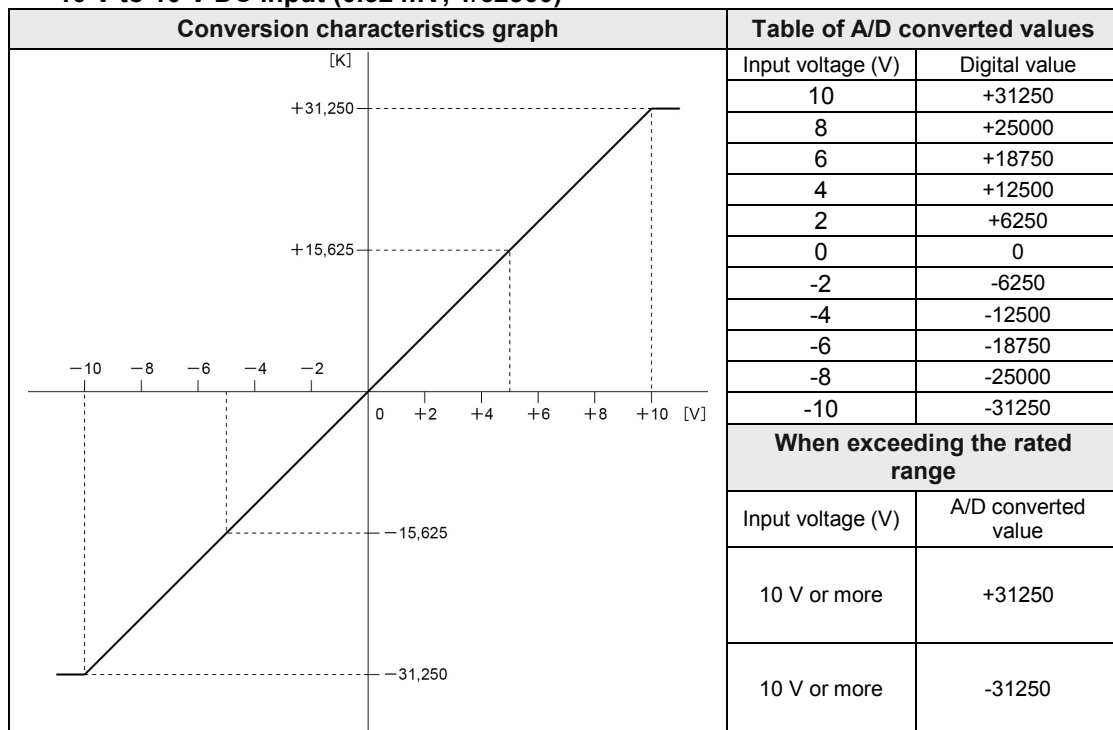
■ **When exceeding the rated range**

- Up to the lower limit -15 °C and the upper limit +15 °C of the range, reference values which the conversion accuracy is not assured are indicated.
- When exceeding the upper limit of the range +30 °C, converted values are "30000".

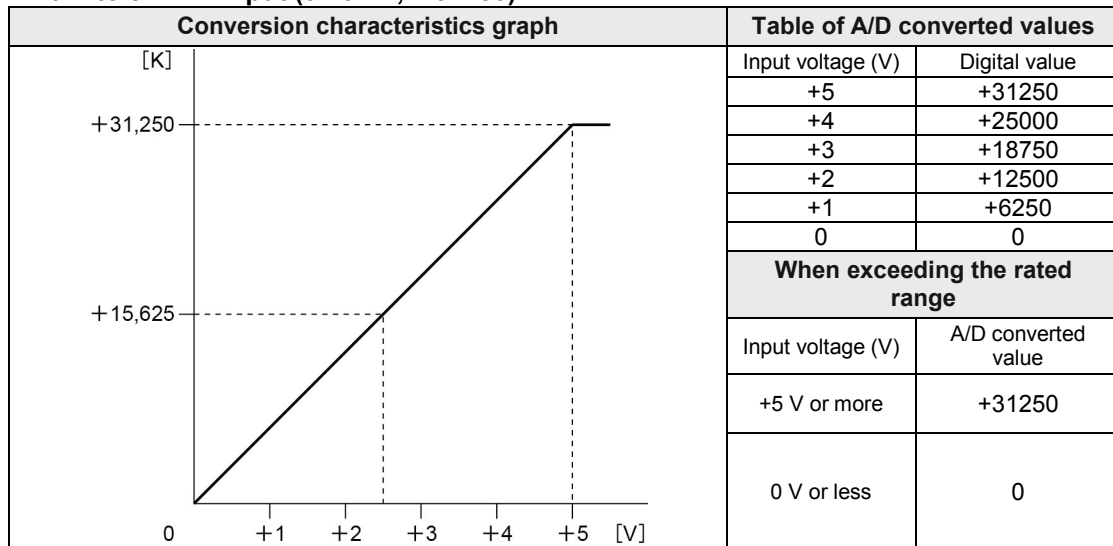
| Range | Input value | Converted value |
|---------------------------|------------------|-----------------|
| K1 (Thermocouple type K) | -115 °C or less | -1150 |
| | +615 °C or more | +6150 |
| K2 (Thermocouple type K) | -215 °C or less | -2150 |
| | +1015 °C or more | +10150 |
| J1 (Thermocouple type J) | -115 °C or less | -1150 |
| | +415 °C or more | +4150 |
| J2 (Thermocouple type J) | -215 °C or less | -2150 |
| | +765 °C or more | +7650 |
| Thermocouple type T | -285 °C or less | -2850 |
| | +415 °C or more | +4150 |
| Thermocouple type N | -285 °C or less | -2850 |
| | +1315 °C or more | +13150 |
| Thermocouple type R | -15 °C or less | -150 |
| | +1775 °C or more | +17750 |
| Thermocouple type S | -15 °C or less | -150 |
| | +1775 °C or more | +17750 |
| Thermocouple type B | -15 °C or less | -150 |
| | +1835 °C or more | +18350 |
| Thermocouple type E | -285 °C or less | -2850 |
| | +1015 °C or more | +10150 |
| Thermocouple type PL II | -15 °C or less | -150 |
| | +1405 °C or more | +14050 |
| Thermocouple type WRe5-26 | -15 °C or less | -150 |
| | +2330 °C or more | +23300 |
| Disconnection | - | +30000 |

5.1.2 Voltage Input Range

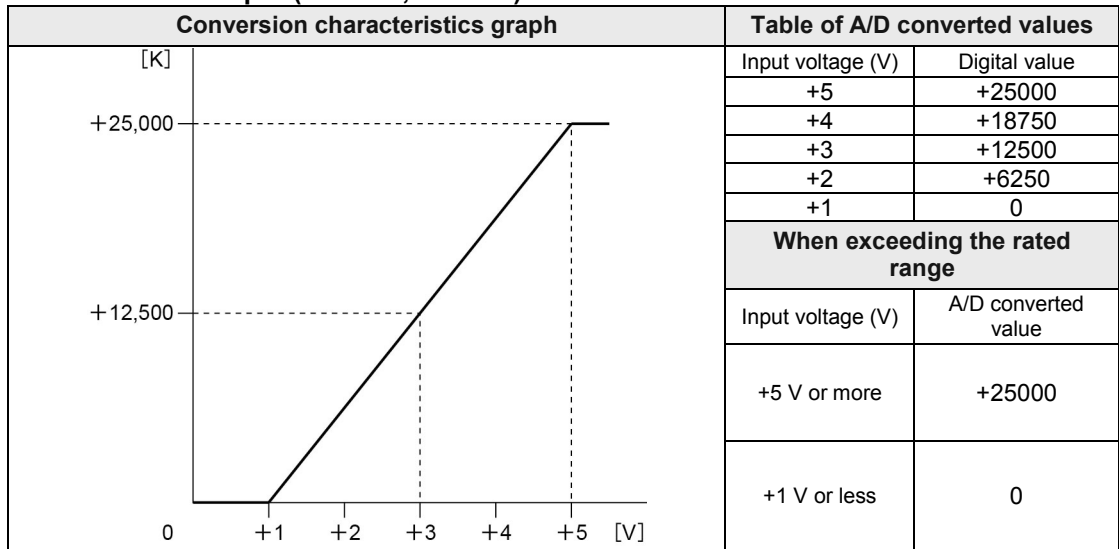
■ -10 V to 10 V DC input (0.32 mV, 1/62500)



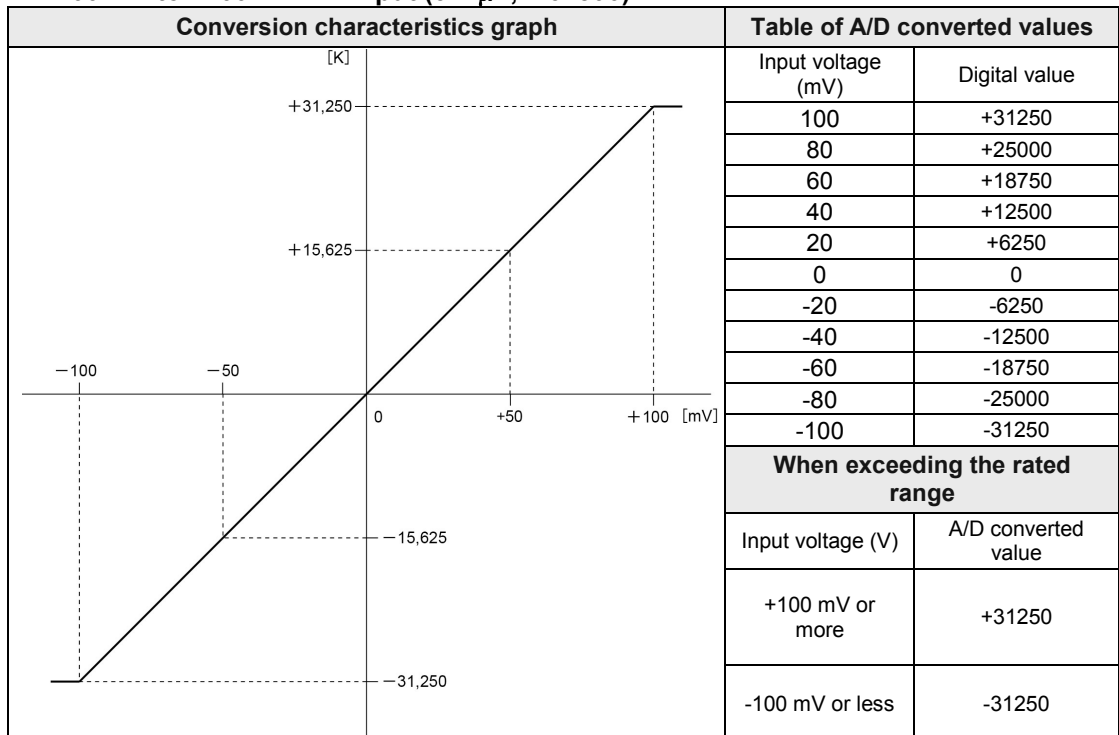
■ 0 V to 5 V DC input (0.16mV, 1/31250)



■ 1 V to 5 V DC input (0.16 mV, 1/25000)

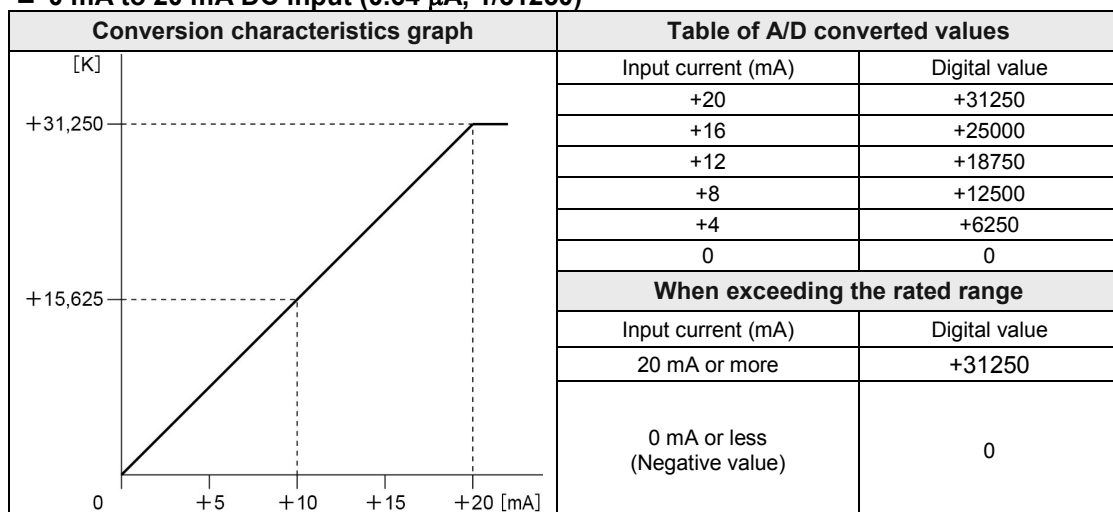


■ -100 mV to +100 mV DC input (3.2 μ V, 1/62500)

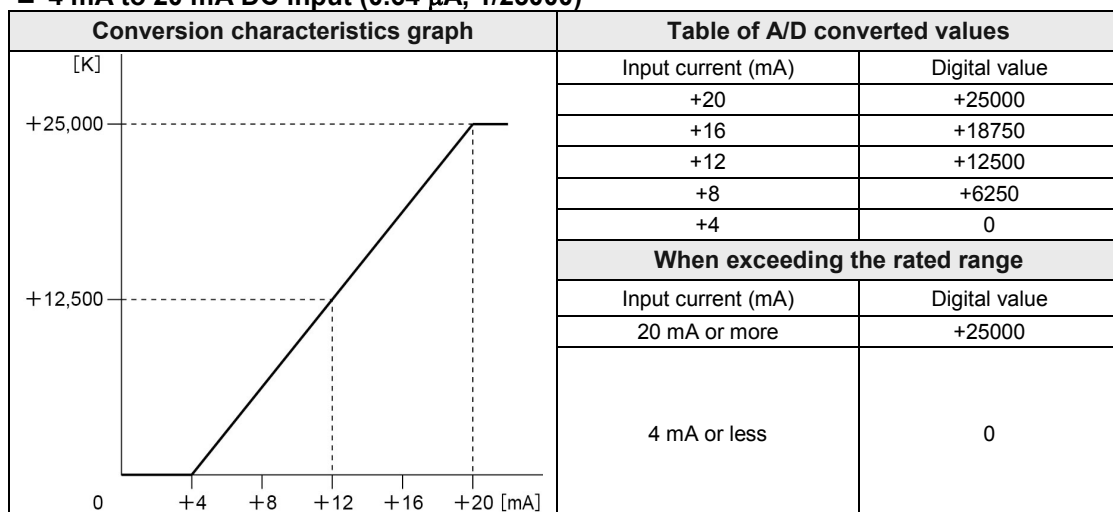


5.1.3 Current Input Range

■ 0 mA to 20 mA DC input (0.64 μ A, 1/31250)



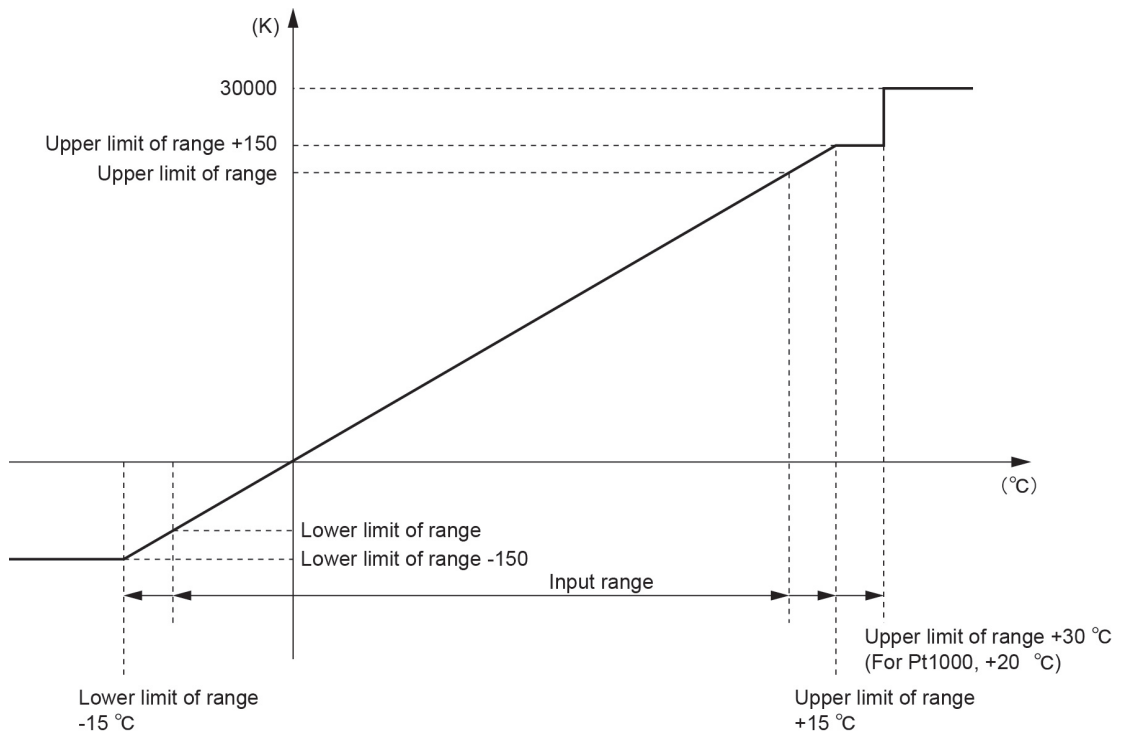
■ 4 mA to 20 mA DC input (0.64 μ A, 1/25000)



5.2 Input Conversion Characteristics (AFP7RTD8)

5.2.1 RTD Input Range

■ Conversion characteristics graph



■ When exceeding the rated range

➡ To the next page

■ When exceeding the rated range

- Up to the lower limit $-15\text{ }^{\circ}\text{C}$ and the upper limit $+15\text{ }^{\circ}\text{C}$ of the range, reference values which the conversion accuracy is not assured are indicated.
- When exceeding the upper limit of the range $+30\text{ }^{\circ}\text{C}$, converted values are "3000". In the case of Pt1000, it is $+20\text{ }^{\circ}\text{C}$.

| Range | Input value | Converted value |
|---------------|--|-----------------|
| Pt100 | $-215\text{ }^{\circ}\text{C}$ or less | -2150 |
| | $+665\text{ }^{\circ}\text{C}$ or more | +6650 |
| Pt100 | $-115\text{ }^{\circ}\text{C}$ or less | -1150 |
| | $+215\text{ }^{\circ}\text{C}$ or more | +2150 |
| JPt100 | $-215\text{ }^{\circ}\text{C}$ or less | -2150 |
| | $+665\text{ }^{\circ}\text{C}$ or more | +6650 |
| JPt100 | $-115\text{ }^{\circ}\text{C}$ or less | -1150 |
| | $+215\text{ }^{\circ}\text{C}$ or more | +2150 |
| Pt1000 | $-115\text{ }^{\circ}\text{C}$ or less | -1150 |
| | $+115\text{ }^{\circ}\text{C}$ or more | +1150 |
| Disconnection | - | +30000 |

6

Optional settings

6.1 Average Processing Settings

6.1.1 Number of Averaging Times

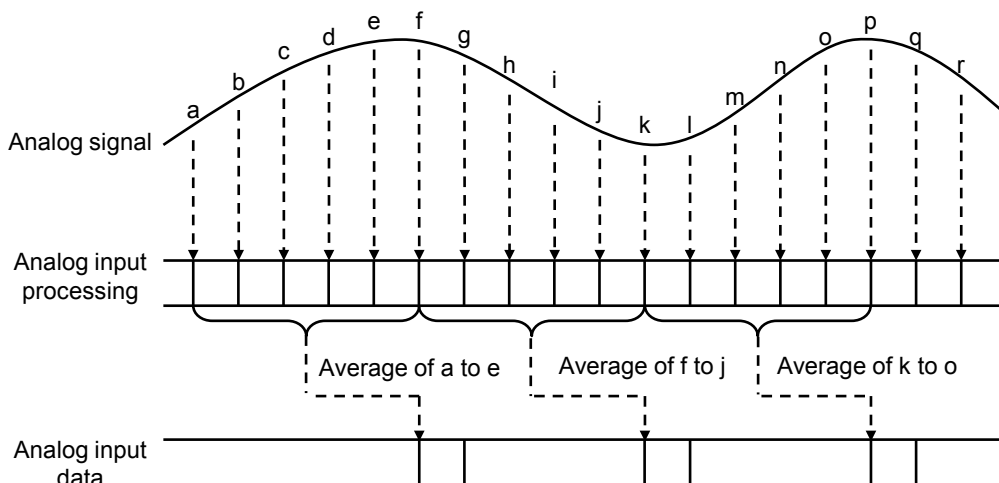
■ Overview of functions

- Analog input data sampled by the unit is averaged and stored as digital values.
- If the number of averaging time is set, analog input data items acquired will be stored in unit memory (UM) as digital values when the number of analog input data items reaches the set number of averaging times.
- If the number of data items acquired is less than the number of averaging times, the first acquired data will be stored in the I/O area.
- Obtain the number of averaging times to be processed from the following input.

| | |
|--------|--|
| Input | The sum of analog input data items for the number of averaging times |
| Output | Number of averaging times value |

■ Processing during the number of averaging times

Averaging setting example: The number of averaging times is set to 5.



■ Configuration

| Name | | Default | Setting range and description |
|------------------|--------------------|-------------|---|
| Function setting | Average processing | Not execute | Select "the number of averaging times". |
| | Averaging constant | K8 | Number: 2 to 60000 [times] (specified with an unsigned integer) |

6.1.2 Time Average

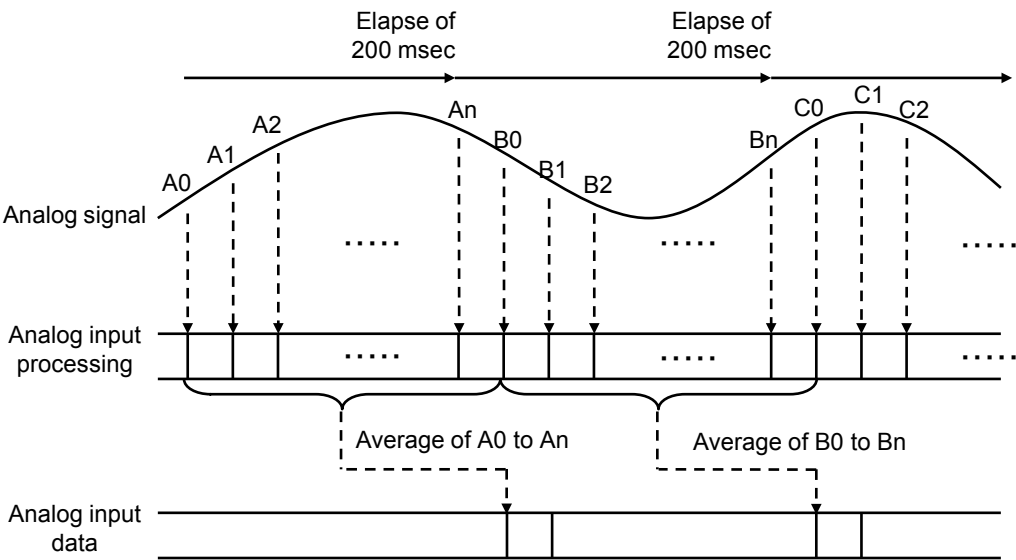
■ Overview of functions

- Analog input data sampled by the unit is averaged and stored as digital values.
- If time average is set, analog input data items acquired will be stored in unit memory (UM) as digital values when the acquisition period of the analog input data items reaches the set averaging time.
- Obtain the time average to be processed from the following input.

| | |
|--------|--|
| Input | The sum of analog input data items for the number of averaging time. |
| Output | Time average value |

■ Processing during time average

Average setting example: Example of an averaging time of 200 msec



■ Configuration

| Name | | Default | Setting range and description |
|------------------|--------------------|-------------|--|
| Function setting | Average processing | Not execute | Select "time average". |
| | Averaging constant | K200 | Time: 200 to 60000 [ms] (specified with an unsigned integer) |

6.1.3 Moving Average

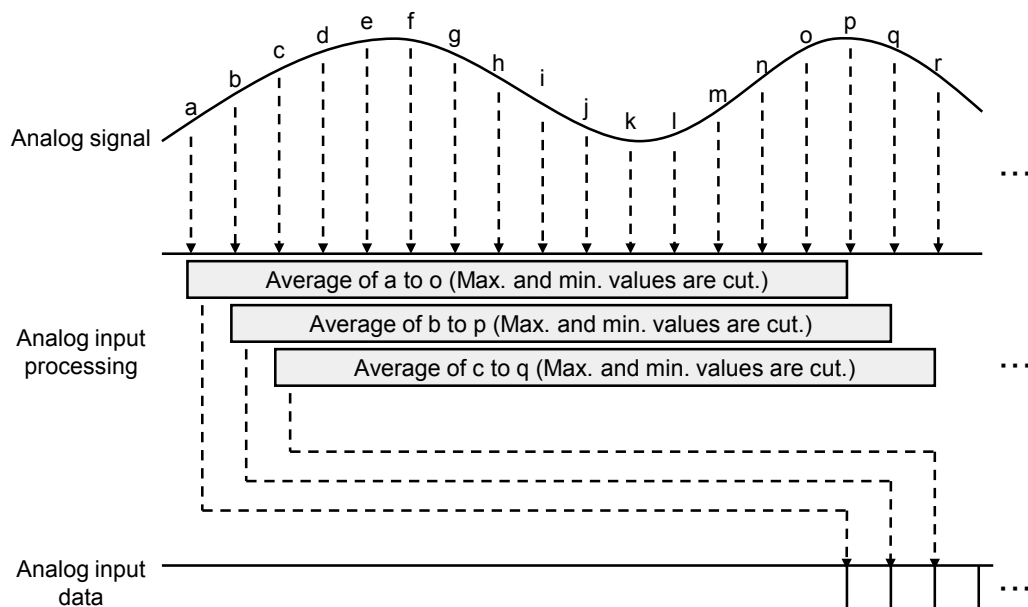
■ Overview of functions

- Analog input data sampled by the unit is averaged and stored as digital values.
- If moving average is set, analog input data items acquired will be stored in unit memory (UM) as digital values when the number of analog input data items reaches the set number of moving average times.
- When the set number of moving average times is 3 to 64, the maximum and minimum values are cut from the data for n times, and the data for (n-2) times is averaged.
- When the set number of moving average times is 1 or 2, the latest measured data is stored without averaging processing.
- When data sampling for the set number of times has not been completed, data is not updated. When all data are acquired, the data will be updated.
- Obtain output (moving average value) to be processed from the following input.

| | |
|--------|---|
| Input | The number of average times, analog input data for the number of average times, the latest analog input data, and old analog input data |
| Output | Moving average value |

■ Processing during moving average

Averaging setting example: The number of averaging times is set to 15.



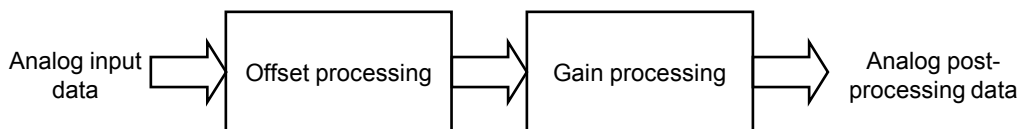
■ Configuration

| Name | | Default | Setting range and description |
|------------------|--------------------|-------------|--|
| Function setting | Average processing | Not execute | Select "moving average". |
| | Averaging constant | K8 | Number: 3 to 64 [times] (specified with an unsigned integer) |

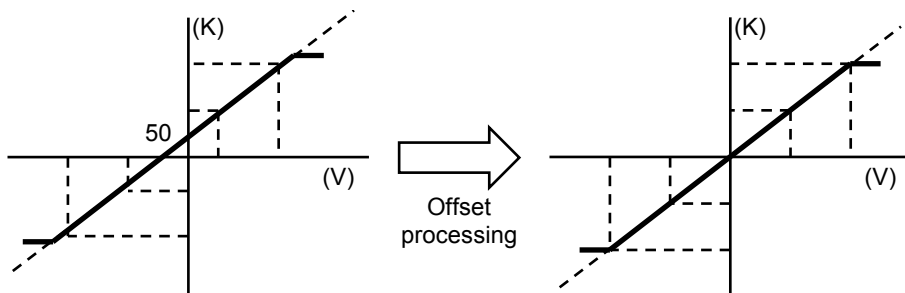
6.2 Offset/Gain Processing

■ Overview of functions

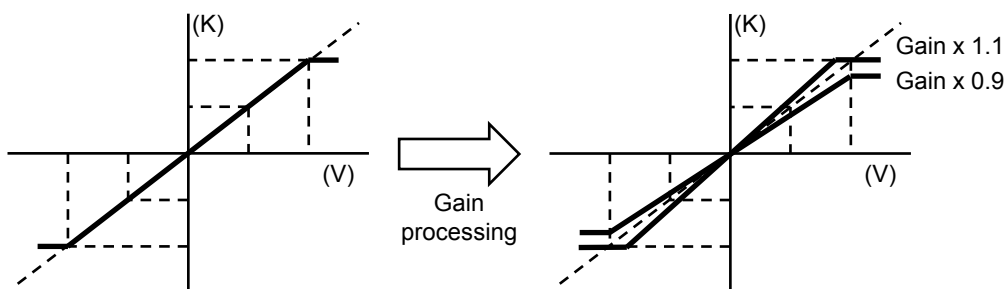
- Offset value (added correction) and gain value (magnification correction) adjustments are made to store processed data in the I/O area.



- Offset value settings are used as a function (zero-point adjustment) to make offset error adjustments between load devices. If the analog conversion value is K50 when the analog input value is 0 V, the analog conversion data is corrected to 0 V based on K-50 as an offset value.



- Gain value settings are used as a function to adjust delicate scale errors between load devices. The gain value slope can be changed in a range of $\times 0.9$ to $\times 1.1$.



- Offset/Gain processing is executed on a channel-by-channel basis.

■ Configuration

| Name | | Default | Setting range and description |
|------------------|------------------------|-------------|--|
| Function setting | Offset/Gain Processing | Not execute | Select "Execute". |
| Offset value | | K0 | Set an offset value at the time of using the offset processing function. Setting range: -3000 to +3000 (specified with a signed integer) |
| Gain value | | K10000 | Set an offset value at the time of using the offset processing function. Setting range: +9000 to +11000 (0.9x to 1.1x: Specified with a signed integer) |



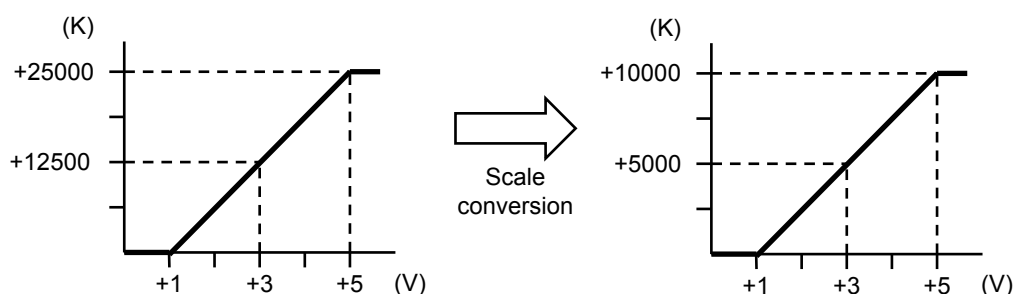
◆ KEY POINTS

- The offset value is corrected to a value corresponding to the resolution of the input range of the original value regardless of whether scale conversion is set or not.

6.3 Scale Conversion (AFP7TC8 Voltage/Current Range Only)

■ Overview of functions

- This function makes it possible to convert values to an easy-to-use data range. Analog input data acquired in a range between preset minimum and maximum values is scale converted and stored in the I/O area. This function is convenient if used for scale unit conversion.
- Scale conversion is executed on a channel-by-channel basis.
- Conversion values read from the analog input unit include fractions. Therefore, convert the values to easy-to-handle figures if needed.



■ Configuration

| Name | | Default | Setting range and description |
|-----------------------------------|------------------|-------------|---|
| Function setting | Scale conversion | Not execute | Select "Execute". |
| Minimum value of scale conversion | | K0 | Set the minimum value at the time of using the scale conversion function. Setting range: -3000 to +30000 (specified with a signed integer) |
| Maximum value of scale conversion | | K10000 | Set the maximum value at the time of using the scale conversion function. Setting range: -3000 to +30000 (specified with a signed integer) |

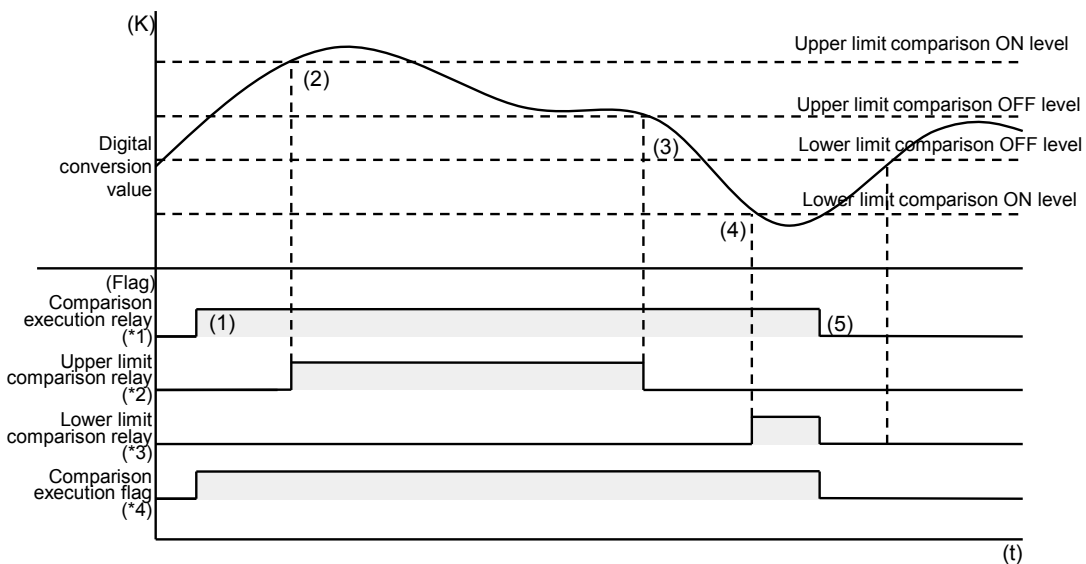
(Note 1) If data outside the minimum or maximum scale is input, scale conversion will be disabled and the minimum or maximum scale value will be stored as a conversion value.

6.4 Comparison for Upper and Lower Limits

■ Overview of functions

This function compares acquired data with the upper limit and lower limit and turns ON the upper limit relay or lower limit relay if the acquired data exceeds the upper limit value or lower limit value.

- Comparison for upper and lower limits is executed on a channel-by-channel basis.
- The upper limit relay will turn ON if the digital conversion value is larger than the upper limit.
- The lower limit relay will turn ON if the digital conversion value is smaller than the lower limit.
- The function will be disabled with the comparison execution relay (Y) turned ON if the configuration-upper/lower limit comparison setting is not executed.



- (1) The upper/lower limit comparison function will be executed when the user program turns ON the comparison execution relay.
- (2) The upper limit comparison relay will turn ON if the upper limit comparison ON level or an upper level is detected.
- (3) The upper limit comparison relay will turn OFF if the upper limit comparison OFF level or a lower level is detected.
- (4) The lower limit comparison relay will turn ON if the lower limit comparison ON level or a lower level is detected.
- (5) The upper/lower limit comparison relay and comparison execution flag will be forcibly turned OFF if the comparison execution relay is turned OFF.

■ I/O allocation

The I/O numbers in the timing chart and program are shown on the condition that the starting word number of the unit is 10. Actual I/O numbers allocated to the analog input unit are determined by the starting word number.

| | CH0 | CH1 | CH2 | CH3 | CH4 | CH5 | CH6 | CH7 |
|---------------------------------|------|------|------|------|------|------|------|------|
| *1 Comparison execution relay | Y103 | Y113 | Y123 | Y133 | Y143 | Y153 | Y163 | Y173 |
| *2 Upper limit comparison relay | X111 | X131 | X151 | X171 | X191 | X211 | X231 | X251 |
| *3 Lower limit comparison relay | X112 | X132 | X152 | X172 | X192 | X212 | X232 | X252 |
| *4 Comparison execution flag | X113 | X133 | X153 | X173 | X193 | X213 | X233 | X253 |

■ Configuration

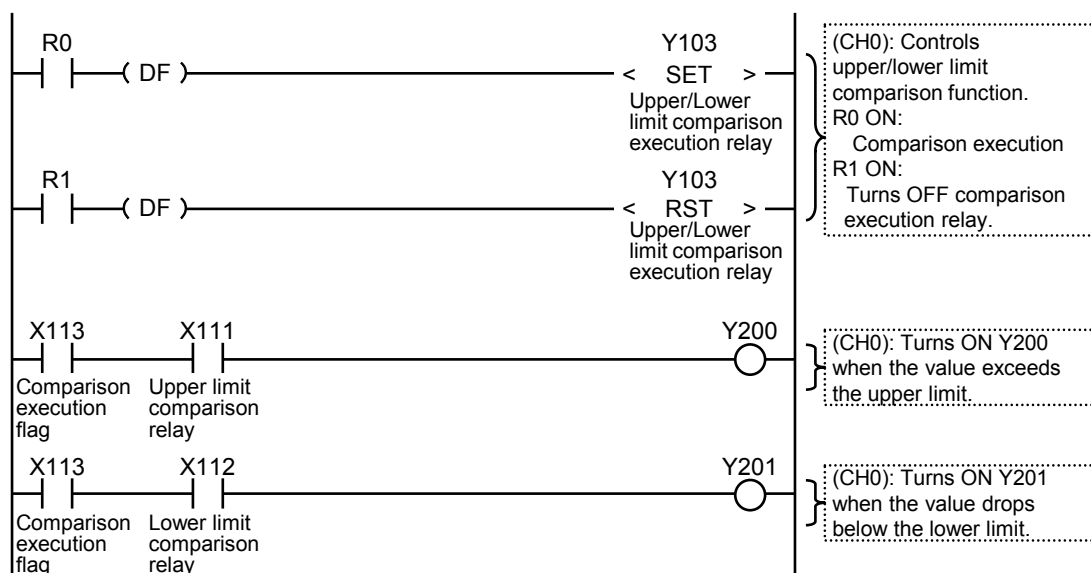
| Name | | Default | Setting range and description |
|---|------------------------------|-------------|--|
| Function setting | Upper/Lower limit comparison | Not execute | Select the desired function to be used. |
| Upper/Lower limit comparison Upper limit comparison ON level | | K1000 | Set the upper limit to turn ON the output flag at the time of using the upper/lower limit comparison function. Setting range: -31250 to +31250 (specified with a signed integer) |
| Upper/Lower limit comparison Upper limit comparison OFF level | | K1000 | Set the upper limit to turn OFF the output flag at the time of using the upper/lower limit comparison function. Setting range: -31250 to +31250 (specified with a signed integer) |
| Upper/Lower limit comparison Lower limit comparison OFF level | | K0 | Set the lower limit to turn OFF the output flag at the time of using the upper/lower limit comparison function. Setting range: -31250 to +31250 (specified with a signed integer) |
| Upper/Lower limit comparison Lower limit comparison ON level | | K0 | Set the lower limit to turn ON the output flag at the time of using the upper/lower limit comparison function. Setting range: -31250 to +31250 (specified with a signed integer) |

(Note 1) Make the following level settings for upper/lower limit comparison.

Lower limit comparison ON level ≤ Lower limit comparison OFF level < Upper limit comparison OFF level ≤ Upper limit comparison ON level

■ Sample program

The digital conversion value on ch0 of the unit is read to detect the upper limit and lower limit, and the desired output is turned ON with the upper or lower limit detected.

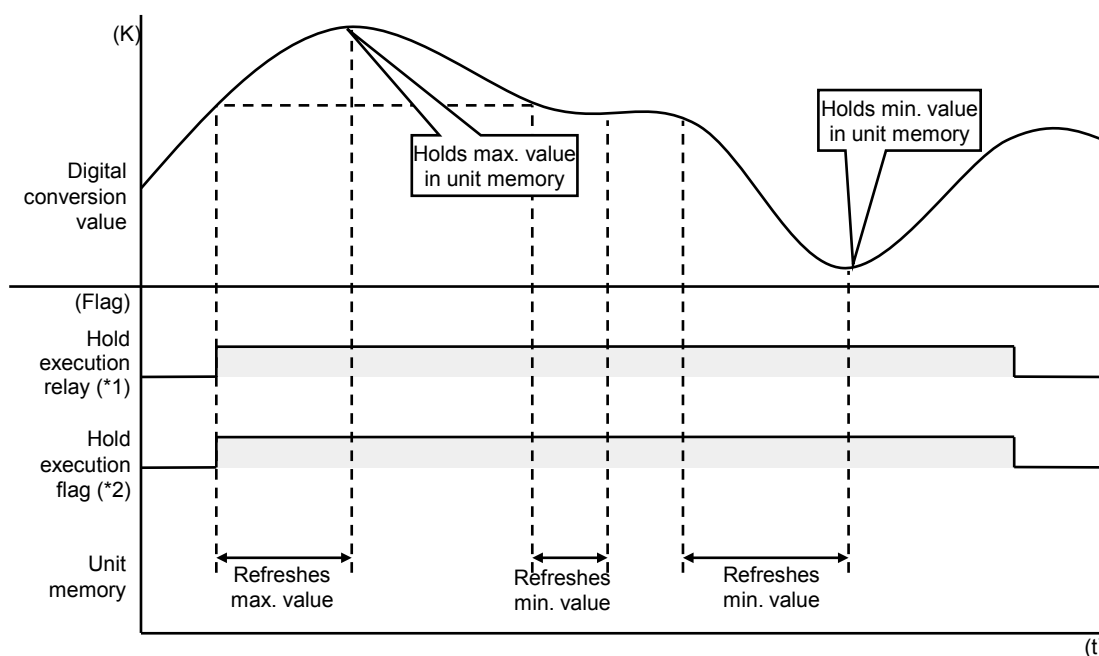


6.5 Holding Maximum and Minimum Values

■ Overview of functions

This function maintains the maximum and minimum values of acquired data. Holds the maximum and minimum digital conversion values when the maximum/minimum value hold setting is enabled, and stores the values in provided unit memories for each channel.

- If the function has not been enabled with the configuration settings, the function will not work with the hold execution relay turned ON.
- When the hold execution relay is turned ON, the values at the time will be preset as maximum and minimum values in the unit memories.
- The maximum and minimum values will be stored in the unit memories even if the hold execution relay is turned OFF or the unit is set into PROG. mode.
- The maximum and minimum values are held on a channel-by-channel basis.



■ Hold data storage area

| Unit memory No. (Hex) | Name | Default | Data range and description |
|--|--------------------|---------|--|
| UM 00170 UM 00171 UM 00172 UM 00173 UM 00174 UM 00175 UM 00176 UM 00177 | Holding max. value | K0 | The acquired maximum value will be held when the maximum and minimum value hold function is used. Setting range: -31250 to +31250 (specified with a signed integer) |
| UM 00178 UM 00179 UM 0017A UM 0017B UM 0017C UM 0017D UM 0017E UM 0017F | Holding min. value | K0 | The acquired maximum value will be held when the maximum and minimum value hold function is used. Setting range: -31250 to +31250 (specified with a signed integer) |

(Note) The unit memory numbers in the above table are listed for CH0 to CH7 in numerical order.

■ I/O allocation

The I/O numbers in the timing chart and program are shown on the condition that the starting word number of the unit is 10. Actual I/O numbers allocated to the analog input unit are determined by the starting word number.

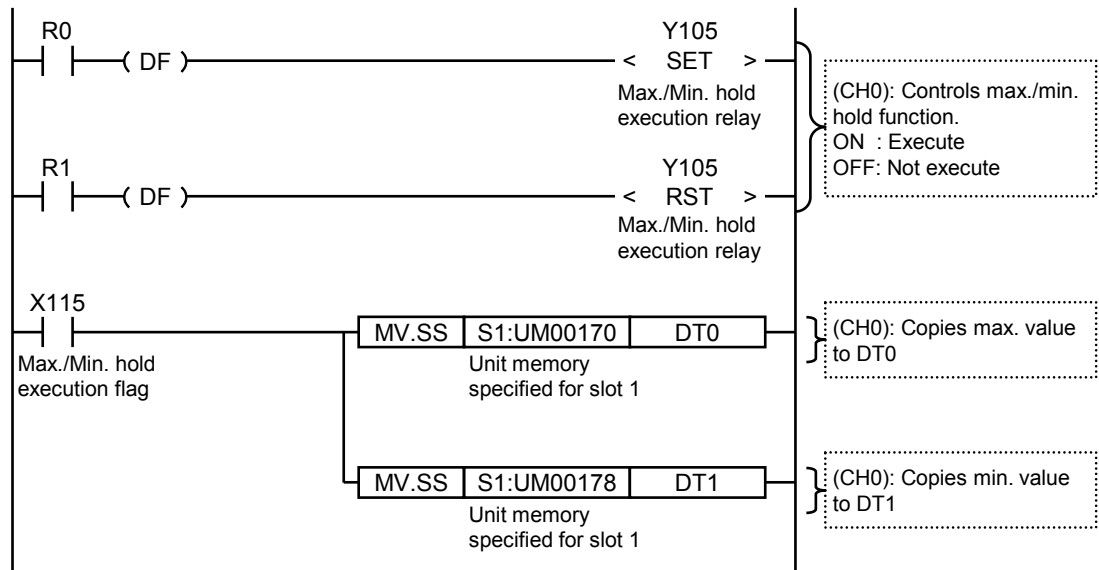
| | CH0 | CH1 | CH2 | CH3 | CH4 | CH5 | CH6 | CH7 |
|-------------------------|------|------|------|------|------|------|------|------|
| *1 Hold execution relay | Y105 | Y115 | Y125 | Y135 | Y145 | Y155 | Y165 | Y175 |
| *2 Hold execution flag | X115 | X135 | X155 | X175 | X195 | X215 | X235 | X255 |

■ Configuration

| Name | | Default | Setting range and description |
|--------------------|--------------------------|-------------|---------------------------------------|
| Function setting | Holding max./min. values | Not execute | Select "Execute". |
| Holding min. value | | K0 | Holding min. value (-31250 to +31250) |
| Holding max. value | | K0 | Holding max. value (-31250 to +31250) |

■ Sample program

The analog data on ch0 of the unit is read, and the data holding the maximum and minimum values will be read at the desired data register.



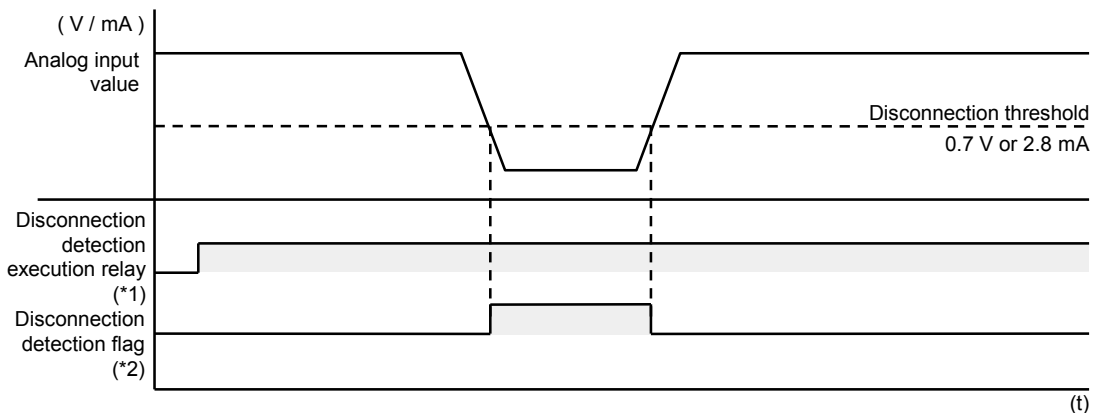
6.6 Disconnection Detection (AFP7TC8)

■ Overview of functions

This function is to announce an error with the disconnection detection flag if the result of input does not reach a certain value while thermocouple input, voltage input range of +1 to +5 V or current input range of +4 to +20 mA is set in the thermocouple multi-analog input unit.

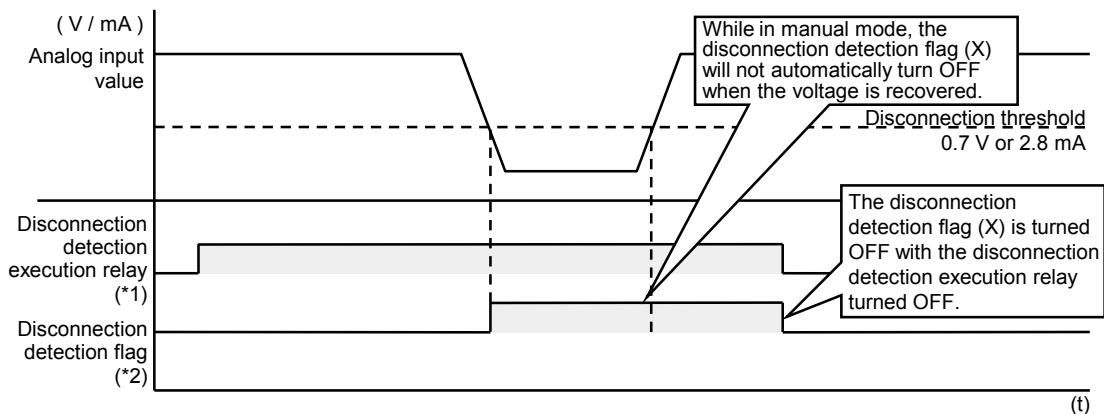
- If disconnection is detected while the disconnection detection execution relay is ON using a user program, the disconnection detection flag will be turned ON.
- There are two ways to reset the disconnection detection. When selecting "Auto", the disconnection detect flag will be automatically turned OFF at the time of reset. If the manual reset setting is made, the disconnection detection flag will be turned OFF by using a user program and turning OFF the disconnection detection execution relay.

■ Action with the detection disconnection reset setting set to auto



(Note) The disconnection threshold in the above figure is that when the voltage input range of +1 to +5 V or current input range of +4 to +20 mA is set.

■ Action with the detection disconnection reset setting set to manual



(Note) The disconnection threshold in the above figure is that when the voltage input range of +1 to +5 V or current input range of +4 to +20 mA is set.

■ I/O allocation

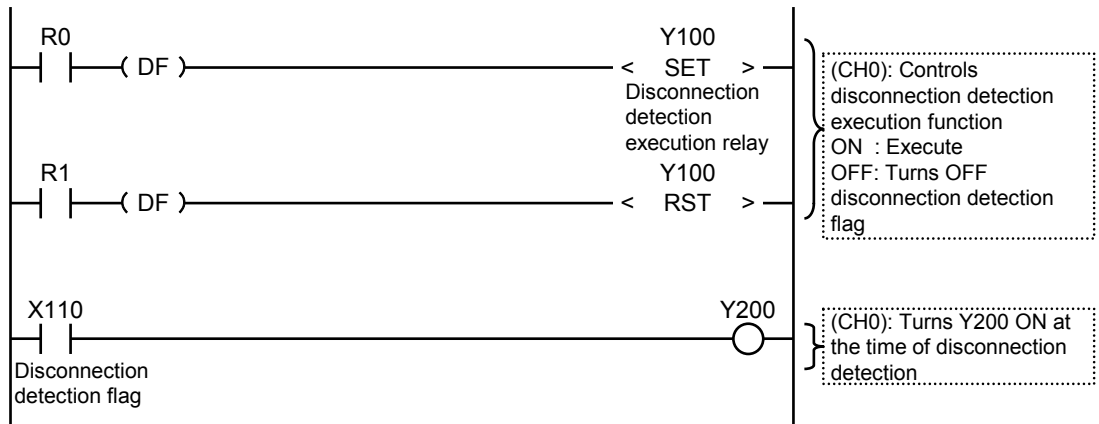
The I/O numbers in the timing chart and program are shown on the condition that the starting word number of the unit is 10. Actual I/O numbers allocated to the analog input unit are determined by the starting word number.

| | CH0 | CH1 | CH2 | CH3 | CH4 | CH5 | CH6 | CH7 |
|--|------|------|------|------|------|------|------|------|
| *1 Disconnection detection execution relay | Y100 | Y110 | Y120 | Y130 | Y140 | Y150 | Y160 | Y170 |
| *2 Disconnection detection flag | X110 | X130 | X150 | X170 | X190 | X210 | X230 | X250 |

■ Configuration

| Name | | Default | Setting range and description |
|------------------|-------------------------------|-------------|-------------------------------|
| Function setting | Disconnection detection | Not execute | Select "Execute". |
| | Disconnection detection reset | Auto | Select "Auto". |

■ Sample program



◆ KEY POINTS

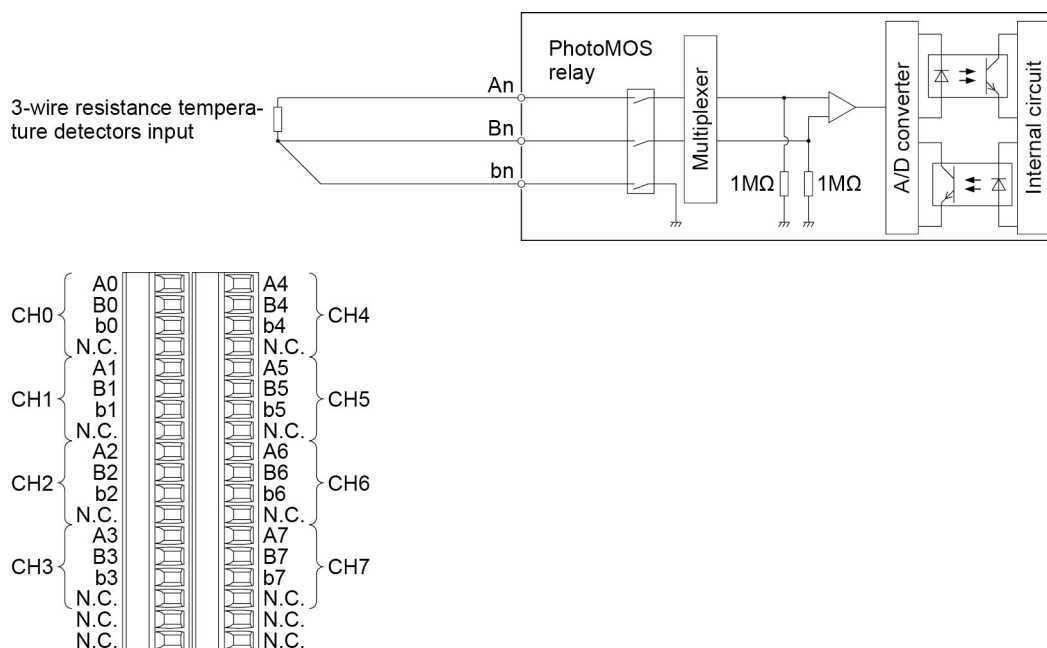
- Not executed unless thermocouple, a voltage input range of +1 to +5 V or current input range of +4 to +20 mA is set. This function will not be executed even if the disconnection detection execution relay is turned ON when the disconnection detection has been set to "Not execute" in the configuration.

6.7 Disconnection Detection (AFP7RTD8)

■ Overview of functions

This function is to warn of the error state by converting to a digital value in the range (K30000) which is different from the values converted in the normal state when the disconnection is detected in the RTD input unit.

- In the figure below, it is regarded as disconnection when the line of the A terminal is disconnected or the lines of the B terminal and b terminal are both disconnected. If either line of the B terminal or b terminal is connected, it is not detected as disconnection.



◆ KEY POINTS

- On the RTD input unit (AFP7RTD8), the disconnection detection execution relay and the disconnection detection flag cannot be used.

7

What to Do If an Error Occurs

7.1 What to Do If an Error Occurs (Analog Input)

7.1.1 Failure in Reading Input Data

- Check again that I/O allocations are correct.
- Check again the connection of the terminal block.
- Check again the configuration settings.

7.1.2 Unstable Input Conversion Value

- Check that the power frequency setting (unit memory UM 00072) complies with the frequency in the region where the unit is used.
- Check that a twisted pair shielded wire is used and the wire is properly shielded.
- Check that the input wiring is not placed close to AC lines or high-tension lines or bundled with the lines.
- Check that there are not power lines, high-tension lines, high-capacity relays, or noise-generating equipment, such as inverters, close to the unit.

7.1.3 No Proper Conversion Values Obtained with Current Input

- Check again the connection of the terminal block.
- Check again the connections of the output equipment.

8

Specifications

8.1 Specifications

8.1.1 General Specifications

| Item | Specifications | |
|----------------------------------|--|------------------------------------|
| Operating ambient temperature | 0 °C to +55 °C | |
| Storage ambient temperature | -40 °C to +70 °C | |
| Operating ambient humidity | 10 to 95%RH (at 25 °C, no condensation) | |
| Storage ambient humidity | 10 to 95%RH (at 25 °C, no condensation) | |
| Breakdown voltage (Note) | Between I/O terminals and CPU power supply terminal/function earth | 500 V AC for 1 minute |
| | Between analog input terminal channels | 200 V AC for 1 minute |
| Insulation resistance | Between I/O terminals and CPU power supply terminal/function earth | 100 MΩ (Test voltage: 500 V DC) |
| Vibration resistance | Conforms to JISB3502 and IEC61131-2. 5 to 8.4 Hz, 3.5-mm single amplitude 8.4 to 150 Hz, Acceleration 9.8 m/s ² 10 sweeps each in X, Y and Z directions (1 octave/min) | |
| Shock resistance | Conforms to JISB3502 and IEC61131-2. 147 m/s ² , 3 times in the X, Y, Z directions | |
| Noise resistance | 1,000 V DC [P-P] with pulse width of 50 ns or 1 μs (by using a noise simulator) (Applied to the power supply of the CPU unit) | |
| Environment | Free from corrosive gases and excessive dust | |
| EU Directive applicable standard | EMC Directive: EN61131-2 | |
| Overvoltage category | Category II | |
| Pollution degree | Pollution level 2 | |

(Note) Cutoff current: 5 mA (Factory default setting)

8.1.2 Specifications of Thermocouple Multi-analog Input Unit (AFP7TC8)

■ Performance specifications

| Item | | Specifications |
|--|--|--|
| Number of channels | | 8 channels |
| Input range (resolution) | Voltage | -10 to 10 V DC (Resolution: 1/62,500) |
| | | 0 to 5 V DC (Resolution: 1/31,250) |
| | | 1 to 5 V DC (Resolution: 1/25,000) (Note 1) |
| | | -100 to 100 mV DC (Resolution: 1/62,500) |
| | Current | 0 to 20 mA (Resolution: 1/31,250) |
| | | 4 to 20 mA (Resolution: 1/25,000) (Note 1) |
| | Thermocouple (resolution: 0.1 °C) | K1: -100.0 to 600.0 °C / K2: -200.0 to 1000.0 °C |
| | | J1: -100.0 to 400.0 °C / J2: -200.0 to 750.0 °C |
| | | T: -270.0 to 400.0 °C |
| | | N: -270.0 to 1300.0 °C |
| | | R: 0.0 to 1760.0 °C |
| | | S: 0.0 to 1760.0 °C |
| | | B: 0.0 to 1820.0 °C |
| E: -270.0 to 1000.0 °C | | |
| PL II : 0.0 to 1390.0 °C | | |
| WRe5-26: 0.0 to 2315.0 °C | | |
| Conversion speed | | Processing time is added to the conversion time for the number of execution channels. High-speed mode: 5 ms/ch + 5 ms (Note 2) Normal mode: 25 ms/ch + 25 ms |
| Indication accuracy (Note 4) | | ±0.1% F.S. or less (at 25 °C in the normal mode)(Note 3) ±0.3% F.S. or less (at 0 to +55 °C) |
| Reference junction compensation accuracy | | ±1.0 °C (with thermocouple input) |
| Input impedance | Voltage input | 1 MΩ |
| | Current input | 250 Ω |
| Absolute max. input | | -15 to 15 V DC Voltage input -2 to 30 mA Current input |
| Insulation method | Between input terminals and internal circuit | Photocoupler Insulated DC/DC converter |
| | Between channels | PhotoMOS relay |
| Execution/Non-execution channel settings | | Possible to make settings on a channel-by-channel basis. |
| Input range selection | | Possible to make settings on a channel-by-channel basis. |

| Item | | Specifications |
|------------------------------|-----------------------------|--|
| Digital processing | Average processing settings | Number of averaging times, Time average, Moving average |
| | Scale conversion setting | A desired value within the range of $\pm 30,000$ (Voltage/current range only) |
| | Offset setting | A desired value within the range of $\pm 3,000$ |
| | Gain setting | $\pm 10\%$ |
| Upper/Lower limit comparison | | Possible to make settings on a channel-by-channel basis. |
| Holding max./min. values | | Possible to make settings on a channel-by-channel basis. |
| Disconnection detection | | Available (Voltage range of 1 to 5 V, current range of 4 to 20 mA and thermocouple range only) |
| External connection method | | Connection terminal block connection |
| Weight (main unit) | | 145 g |
| Consumption current | | 80 mA or less |

(Note 1) The full scale (F.S.) on the accuracy of a voltage range from 1 to 5 V DC and that of a current range from 4 to 20 mA are 0 to 5 V DC and 0 to 20 mA, respectively.

(Note 2) The indication accuracy in the high-speed mode is $\pm 0.3\%$ (at 0 to 55 °C).

(Note 3) The indication accuracy rating of the thermocouple range varies by the input type of the thermocouple to be used and measurement temperature.

(Note 4) If highly accurate temperature data is necessary, use the temperature data in about 30 minutes after the unit was powered on.

(Note 5) If a sudden temperature change occurs in the unit, the accuracy may not be stable temporarily. Install to keep the unit out of the direct wind from devices such as a cooling fan in a control panel.



◆ REFERENCE

- Also refer to the section "Indication accuracy rating of thermocouple range" on the next page.

■ Indication accuracy rating of thermocouple range

| Thermocouple | Measurement temperature range (Note 1) | Normal mode: 25-ms conversion | | High-speed mode: 5-ms conversion |
|--------------|---|-------------------------------|-----------------------------------|-----------------------------------|
| | | Ambient temperature 25 °C | Ambient temperature 0 to 55 °C | Ambient temperature 0 to 55 °C |
| K1 | -100.0 to 600.0 °C | 0.1% | ±0.3% | ±0.30% |
| K2 | -200.0 to 1000.0 °C | ±0.1% | ±0.3% | ±0.30% |
| J1 | -100.0 to 400.0 °C | ±0.1% | ±0.3% | ±0.30% |
| J2 | -200.0 to 750.0 °C | ±0.1% | ±0.3% | ±0.30% |
| T | -270.0 to -200.0 °C | (Note 2) | (Note 2) | (Note 2) |
| | -200.0 to 0.0 °C | ±0.15% | ±0.3% | ±0.30% |
| | 0.0 to 400.0 °C | ±0.1% | ±0.3% | ±0.30% |
| N | -270.0 to -200.0 °C | (Note 2) | (Note 2) | (Note 2) |
| | -200.0 to 0.0 °C | ±0.15% | ±0.3% | ±0.30% |
| | 0.0 to 1300.0 °C | ±0.1% | ±0.3% | ±0.30% |
| R | 0.0 to 300.0 °C | ±0.15% | ±0.3% | ±1.00% |
| | 300.0 to 1760.0 °C | ±0.1% | ±0.3% | ±0.30% |
| S | 0.0 to 300.0 °C | ±0.15% | ±0.3% | ±1.00% |
| | 300.0 to 1760.0 °C | ±0.1% | ±0.3% | ±0.30% |
| B | 0.0 to 400.0 °C | (Note 2) | (Note 2) | (Note 2) |
| | 400.0 to 800.0 °C | ±0.15% | ±0.3% | ±1.00% |
| | 800.0 to 1820.0 °C | ±0.1% | ±0.3% | ±0.30% |
| E | -270.0 to -200.0 °C | (Note 2) | (Note 2) | (Note 2) |
| | 200.0 to 0.0 °C | ±0.15% | ±0.3% | ±1.00% |
| | 0.0 to 1000.0 °C | ±0.1% | ±0.3% | ±0.30% |
| PLII | 0.0 to 1390.0 °C | ±0.1% | ±0.3% | ±0.30% |
| WRe5-26 | 0.0 to 2315.0 °C | ±0.1% | ±0.3% | ±0.30% |

(Note 1) Although it is possible to measure the temperature of ±15 °C outside the measurement temperature range, the accuracy cannot be assured.

(Note 2) Although it is possible to measure temperatures, the accuracy cannot be assured.

8.1.3 Specifications of RTD Unit (AFP7RTD8)

| Item | | Specifications |
|--|--|---|
| Number of channels | | 8 channels |
| Input range (resolution) | RTD (resolution: 0.1 °C) | Pt100 (1): -100.0 to 200.0 °C |
| | | Pt100 (2): -200.0 to 650.0 °C |
| | | JPt100 (1): -100.0 to 200.0 °C |
| | | JPt100(2): -200.0 to 650.0 °C |
| | | Pt1000: -100.0 to 100.0 °C |
| Conversion speed | | Processing time is added to the conversion time for the number of execution channels. 25 ms/ch + 25 ms |
| Total accuracy | | ±0.1%F.S. or less (at 25 °C) ±0.3%F.S. or less (at 0 to +55 °C) |
| Allowable signal source resistance | | RTD input: 30 Ω (3-wire balance) |
| Insulation method | Between input terminals and internal circuit | Photocoupler Insulated DC/DC converter |
| | Between channels | PhotoMOS relay |
| Execution/Non-execution channel settings | | Possible to make settings on a channel-by-channel basis. |
| Input range selection | | Possible to make settings on a channel-by-channel basis. |
| Digital processing | Average processing | Number of averaging times, Time average, Moving average |
| | Offset setting | A desired value within the range of ±3,000 |
| | Gain setting | ±10% |
| Upper/Lower limit comparison | | Possible to make settings on a channel-by-channel basis. |
| Holding max./min. values | | Possible to make settings on a channel-by-channel basis. |
| Disconnection detection | | Available |
| External connection method | | Connection terminal block connection |
| Weight (main unit) | | 145 g |
| Consumption current | | 65 mA or less |

(Note) If highly accurate temperature data is necessary, use the temperature data in about 30 minutes after the unit was powered on.

8.2 I/O Allocation

■ Input contact

| I/O area number | Name | Default | Description |
|-----------------|----------------------------|---------|---|
| WX0 | CH0 Analog conversion data | K0 | <p>Analog conversion data area Digital conversion values corresponding to analog input are stored as 16-bit signed integer data. Stored values vary by ranges. When optional average processing, scale conversion, offset/gain processing has been set, data after the processing is stored.</p> <p>Optional function flag area Refer to the next page.</p> |
| WX1 | CH0 Optional function flag | H0 | |
| WX2 | CH1 Analog conversion data | K0 | |
| WX3 | CH1 Optional function flag | H0 | |
| WX4 | CH2 Analog conversion data | K0 | |
| WX5 | CH2 Optional function flag | H0 | |
| WX6 | CH3 Analog conversion data | K0 | |
| WX7 | CH3 Optional function flag | H0 | |
| WX8 | CH4 Analog conversion data | K0 | |
| WX9 | CH4 Optional function flag | H0 | |
| WX10 | CH5 Analog conversion data | K0 | |
| WX11 | CH5 Optional function flag | H0 | |
| WX12 | CH6 Analog conversion data | K0 | |
| WX13 | CH6 Optional function flag | H0 | |
| WX14 | CH7 Analog conversion data | K0 | |
| WX15 | CH7 Optional function flag | H0 | |

(Note 1): The I/O numbers in the table indicates offset addresses. The I/O numbers actually allocated are the numbers based on the starting word number allocated to the unit. Example) When the starting word number for the unit is "10", the A/D conversion data of CH0 is WX10 and the error flag is X11F.

■ Input contact (Optional functions/Error flag area)

| I/O number | | | | | | | | Name | Description |
|------------|------------|------------|------------|------------|--------------|--------------|--------------|---|---|
| CH0 | CH1 | CH2 | CH3 | CH4 | CH5 | CH6 | CH7 | | |
| X10 | X30 | X50 | X70 | X90 | X110 | X130 | X150 | Disconnection detection flag | ON with disconnection detected and OFF with disconnection restored. (Valid for thermocouple, voltage:1-5 V and current: 4-20 mA ranges only) |
| X11 | X31 | X51 | X71 | X91 | X111 | X131 | X151 | Upper limit comparison relay | Turns ON when the value exceeds the set upper limit. |
| X12 | X32 | X52 | X72 | X92 | X112 | X132 | X152 | Lower limit comparison relay | Turns OFF when the value drops below the set lower limit. |
| X13 | X33 | X53 | X73 | X93 | X113 | X133 | X153 | Upper/Lower limit comparison execution flag | Turns ON when the upper limit/lower limit comparison function is executed. |
| X14 | X34 | X54 | X74 | X99 | X114 | X134 | X154 | Not used | Do not use. |
| X15 | X35 | X55 | X75 | X95 | X115 | X135 | X155 | Max./Min. hold execution flag | Turns ON when the max./min. hold function is executed. |
| X16 to X1E | X36 to X3E | X56 to X5E | X76 to X7E | X96 to X9E | X116 to X11E | X136 to X13E | X156 to X15E | Not used | Do not use. |
| X1F | X3F | X5F | X7F | X9F | X11F | X13F | X15F | Error flag | Turns ON when an error occurs |

(Note 1): The I/O numbers in the table indicates offset addresses. The I/O numbers actually allocated are the numbers based on the starting word number allocated to the unit. Example) When the starting word number for the unit is "10", the C error flag is X11F.

■ Output contact

| I/O number | | | | | | | | Name | Description |
|------------|------------|------------|------------|------------|------------|------------|------------|--|--|
| CH0 | CH1 | CH2 | CH3 | CH4 | CH5 | CH6 | CH7 | | |
| Y0 | Y10 | Y20 | Y30 | Y40 | Y50 | Y60 | Y70 | Disconnection detection execution relay | ON to execute the disconnection detection function. OFF to turn OFF the disconnection detection flag (Xn0). (Valid for thermocouple, voltage:1-5 V and current: 4-20 mA ranges only) |
| Y1 | Y11 | Y21 | Y31 | Y41 | Y51 | Y61 | Y71 | Not used | Do not use. |
| Y2 | Y12 | Y22 | Y32 | Y42 | Y52 | Y62 | Y72 | | |
| Y3 | Y13 | Y23 | Y33 | Y43 | Y53 | Y63 | Y73 | Upper/Lower limit comparison execution relay | ON to execute the function to compare the upper and lower limits. OFF to turn OFF the upper limit comparison relay (Xn1) and lower limit comparison relay (Xn2). |
| Y4 | Y14 | Y24 | Y34 | Y44 | Y54 | Y64 | Y74 | Not used | Do not use. |
| Y5 | Y15 | Y25 | Y35 | Y45 | Y55 | Y65 | Y75 | Max./Min. hold execution relay | ON to execute the max./min. hold function. |
| Y6 to YE | Y16 to Y1E | Y26 to Y2E | Y36 to Y3E | Y46 to Y4E | Y56 to Y5E | Y66 to Y6E | Y76 to Y7E | Not used | Do not use. |
| YF | Y1F | Y2F | Y3F | Y4F | Y5F | Y6F | Y7F | Error flag reset relay | Resets an error flag. |

(Note 1): The I/O numbers in the table indicates offset addresses. The I/O numbers actually allocated are the numbers based on the starting word number allocated to the unit. Example) When the starting word number for the unit is "10", the disconnection detection execution relay of CH0 is Y100, and the error flag reset relay is Y10F.

8.3 List of Unit Memories

8.3.1 Configuration Area

User programs are not necessary, because the configuration area will be written automatically if it is set with the tool software. In the case of changing settings with user programs, specify the desired unit memory number and write the corresponding values.

■ Setting monitoring items and allocation of unit memories (CH0 to CH3)

| Setting monitoring item | | Unit memory (UM) number | | | |
|-----------------------------------|--|-------------------------|----------|----------|----------|
| | | CH0 | CH1 | CH2 | CH3 |
| Configuration settings refresh | | UM 00028 | | | |
| Power frequency setting | | UM 00071 | | | |
| Conversion time setting | | UM 00072 | | | |
| Conversion processing | | UM 00080 | UM 00090 | UM 000A0 | UM 000B0 |
| Range setting | | UM 00081 | UM 00091 | UM 000A1 | UM 000B1 |
| Function setting 1 | Average processing | UM 00082 | UM 00092 | UM 000A2 | UM 000B2 |
| | Offset/Gain processing | | | | |
| | Scale conversion | | | | |
| Function setting 2 | Upper/Lower limit comparison | UM 00083 | UM 00093 | UM 000A3 | UM 000B3 |
| | Holding max./min. values | | | | |
| | Disconnection detection, Disconnection detection reset | | | | |
| Averaging constant | | UM 00084 | UM 00094 | UM 000A4 | UM 000B4 |
| Offset value | | UM 00085 | UM 00095 | UM 000A5 | UM 000B5 |
| Gain value | | UM 00086 | UM 00096 | UM 000A6 | UM 000B6 |
| Scale conversion | Max. value | UM 00087 | UM 00097 | UM 000A7 | UM 000B7 |
| | Min. value | UM 00088 | UM 00098 | UM 000A8 | UM 000B8 |
| Upper/Lower limit comparison | Upper limit comparison ON level | UM 00089 | UM 00099 | UM 000A9 | UM 000B9 |
| | Upper limit comparison OFF level | UM 0008A | UM 0009A | UM 000AA | UM 000BA |
| | Lower limit comparison OFF level | UM 0008B | UM 0009B | UM 000AB | UM 000BB |
| | Lower limit comparison ON level | UM 0008C | UM 0009C | UM 000AC | UM 000BC |
| Max./Min. value hold monitor area | Holding max. value | UM 00170 | UM 00171 | UM 00172 | UM 00173 |
| | Holding min. value | UM 00178 | UM 00179 | UM 0017A | UM 0017B |

■ Setting monitoring items and allocation of unit memories (CH4 to CH7)

| Setting monitoring item | | Unit memory (UM) number | | | |
|-----------------------------------|----------------------------------|-------------------------|----------|----------|----------|
| | | CH4 | CH5 | CH6 | CH7 |
| Configuration settings refresh | | UM 00028 | | | |
| Power frequency setting | | UM 00071 | | | |
| Conversion time setting | | UM 00072 | | | |
| Conversion processing | | UM 000C0 | UM 000D0 | UM 000E0 | UM 000F0 |
| Range setting | | UM 000C1 | UM 000D1 | UM 000E1 | UM 000F1 |
| Function setting 1 | Average processing | UM 000C2 | UM 000D2 | UM 000E2 | UM 000F2 |
| | Offset/Gain processing | | | | |
| | Scale conversion | | | | |
| Function setting 2 | Upper/Lower limit comparison | UM 000C3 | UM 000D3 | UM 000E3 | UM 000F3 |
| | Holding max./min. values | | | | |
| | Disconnection detection | | | | |
| | Disconnection detection reset | | | | |
| Averaging constant | | UM 000C4 | UM 000D4 | UM 000E4 | UM 000F4 |
| Offset value | | UM 000C5 | UM 000D5 | UM 000E5 | UM 000F5 |
| Gain value | | UM 000C6 | UM 000D6 | UM 000E6 | UM 000F6 |
| Scale conversion | Max. value | UM 000C7 | UM 000D7 | UM 000E7 | UM 000F7 |
| | Min. value | UM 000C8 | UM 000D8 | UM 000E8 | UM 000F8 |
| Upper/Lower limit comparison | Upper limit comparison ON level | UM 000C9 | UM 000D9 | UM 000E9 | UM 000F9 |
| | Upper limit comparison OFF level | UM 000CA | UM 000DA | UM 000EA | UM 000FA |
| | Lower limit comparison OFF level | UM 000CB | UM 000DB | UM 000EB | UM 000FB |
| | Lower limit comparison ON level | UM 000CC | UM 000DC | UM 000EC | UM 000FC |
| Max./Min. value hold monitor area | Holding max. value | UM 00174 | UM 00175 | UM 00176 | UM 00177 |
| | Holding min. value | UM 0017C | UM 0017D | UM 0017E | UM 0017F |



◆ NOTES

- Unit memories (UM) include the areas used in the system. Do not write data with user programs in the areas other than the configuration area where the settings are opened.

| Unit memory (UM) No. range | Application |
|--|------------------------------|
| UM00000 to UM0006F (UM 00028 can be set.) | Reserved area for the system |
| UM00070 to UM000FF | Configuration area |
| UM00100 to UM0016F | Reserved area for the system |
| UM00170 to UM001FF | Monitor area |
| UM00200 to UM0FFFF | Reserved area for the system |

8.4 List of Detailed Specifications of Unit Memories

■ Common to all channels

| Unit memory No. (Hex) | Name | Default | Setting range and description |
|-----------------------|---------------------|---------|--|
| UM 00028 | Unit memory refresh | H0 | This is used to rewrite configuration information using a user program. If the constant "55AA" is written to the unit memory UM 00028 after transferring a desired parameter to a unit memory, the settings will be updated. The value of unit memory UM 00028 will be set to 0 when the configuration information is refreshed. |
| UM 00071 | Power frequency | H0 | Select a power frequency. H0: 60 Hz H1: 50 Hz |
| UM 00072 | Conversion time | H0 | For the thermocouple multi-analog input unit, select a conversion time per channel. H0: 25 ms H1: 5 ms |

■ Individual setting area per channel

| Unit memory No. (Hex) | Name | Default | Setting range and description | |
|--|---|---------|---|---|
| UM 00080 UM 00090 UM 000A0 UM 000B0 UM 000C0 UM 000D0 UM 000E0 UM 000F0 | Conversion processing Execution/Non-execution | H1 | Select whether to execute the conversion processing or not. H0: Not execute H1: Execute | |
| UM 00081 UM 00091 UM 000A1 UM 000B1 UM 000C1 UM 000D1 UM 000E1 UM 000F1 | Range setting For Thermocouple multi-analog input unit | H1 | Select the input range. | |
| | | | 0001h | Voltage input -10 V to +10 V |
| | | | 0002h | Voltage input 0 V to +5 V |
| | | | 0003h | Voltage input 1 V to +5 V |
| | | | 0004h | Voltage input -100 mV to +100 mV |
| | | | 0005h | Current input 0 mA to +20 mA |
| | | | 0006h | Current input +4 mA to +20 mA |
| | | | 0010h | Thermocouple input K1 (-100.0 to 600.0 °C) |
| | | | 0011h | Thermocouple input K2 (-200.0 to 1000.0 °C) |
| | | | 0012h | Thermocouple input J1 (-100.0 to 400.0 °C) |
| | | | 0013h | Thermocouple input J2 (-200.0 to 750.0 °C) |
| | | | 0014h | Thermocouple input T (-270.0 to 400.0 °C) |
| | | | 0015h | Thermocouple input N (-270.0 to 1300.0 °C) |
| | | | 0016h | Thermocouple input R (0.0 to 1760.0 °C) |
| | | | 0017h | Thermocouple input S (0.0 to 1760.0 °C) |
| | | | 0018h | Thermocouple input B (0.0 to 1820.0 °C) |
| | | | 0019h | Thermocouple input E (-270.0 to 1000.0 °C) |
| | | | 001Ah | Thermocouple input PL II (0.0 to 1390.0 °C) |
| | | | 001Bh | Thermocouple input WRe5-26 (0.0 to 2315.0 °C) |
| UM 00081 UM 00091 UM 000A1 UM 000B1 UM 000C1 UM 000D1 UM 000E1 UM 000F1 | Range setting For RTD input unit | H1 | Select the input range. | |
| | | | 0001h | RTD input Pt100-1 (-100.0 to 200.0 °C) |
| | | | 0002h | RTD input Pt100-2 (-200.0 to 650.0 °C) |
| | | | 0003h | RTD input JPt100-1 (-100.0 to 200.0 °C) |
| | | | 0004h | RTD input JPt100-2 (-100.0 to 200.0 °C) |
| | | | 0005h | RTD input Pt1000 (-100.0 to 100.0 °C) |

(Note) The unit memory numbers in the above table are listed for CH0 to CH7 in numerical order.

■ Individual setting area per channel

| Unit memory No. (Hex) | Name | Default | Setting range and description | | | | | | | | | | | | | | | |
|--|--|---|---|---------------|----------|------------------------|---|------------------------------|---|----------------|---|------------------------------|------|-------------------------|------------------------------|-------|-------------------------------|--|
| UM 00082 UM 00092 UM 000A2 UM 000B2 UM 000C2 UM 000D2 UM 000E2 UM 000F2 | Function setting 1 Average processing Offset/Gain Processing Scale conversion | H0 | <div>Select the desired function to be used.</div> <table><tr><th>bit</th><th>Name</th><th>Settings</th></tr><tr><td>3-0</td><td>Average processing</td><td>H0 Not execute H1 No. of averaging times H2 Time average H3 Moving average</td></tr><tr><td>7-4</td><td>Offset/Gain Processing</td><td>H0 Not execute H1 Execute</td></tr><tr><td>11-8</td><td>Scale conversion</td><td>H0 Not execute H1 Execute</td></tr><tr><td>15-12</td><td>Not used</td><td></td></tr></table> | bit | Name | Settings | 3-0 | Average processing | H0 Not execute H1 No. of averaging times H2 Time average H3 Moving average | 7-4 | Offset/Gain Processing | H0 Not execute H1 Execute | 11-8 | Scale conversion | H0 Not execute H1 Execute | 15-12 | Not used | |
| bit | Name | Settings | | | | | | | | | | | | | | | | |
| 3-0 | Average processing | H0 Not execute H1 No. of averaging times H2 Time average H3 Moving average | | | | | | | | | | | | | | | | |
| 7-4 | Offset/Gain Processing | H0 Not execute H1 Execute | | | | | | | | | | | | | | | | |
| 11-8 | Scale conversion | H0 Not execute H1 Execute | | | | | | | | | | | | | | | | |
| 15-12 | Not used | | | | | | | | | | | | | | | | | |
| UM 00083 UM 00093 UM 000A3 UM 000B3 UM 000C3 UM 000D3 UM 000E3 UM 000F3 | Function setting 2 Upper/Lower limit comparison Holding max./min. values Disconnection detection Disconnection detection reset | H0 | <div>Select the desired function to be used.</div> <table><tr><th>bit</th><th>Name</th><th>Settings</th></tr><tr><td>3-0</td><td>Upper/Lower limit comparison</td><td>H0 Not execute H1 Execute</td></tr><tr><td>7-4</td><td>Max./Min. values hold</td><td>H0 Not execute H1 Execute</td></tr><tr><td>11-8</td><td>Disconnection detection</td><td>H0 Not execute H1 Execute</td></tr><tr><td>15-12</td><td>Disconnection detection reset</td><td>H0 Auto (Auto reset for reconnection) H1 Manual</td></tr></table> | bit | Name | Settings | 3-0 | Upper/Lower limit comparison | H0 Not execute H1 Execute | 7-4 | Max./Min. values hold | H0 Not execute H1 Execute | 11-8 | Disconnection detection | H0 Not execute H1 Execute | 15-12 | Disconnection detection reset | H0 Auto (Auto reset for reconnection) H1 Manual |
| bit | Name | Settings | | | | | | | | | | | | | | | | |
| 3-0 | Upper/Lower limit comparison | H0 Not execute H1 Execute | | | | | | | | | | | | | | | | |
| 7-4 | Max./Min. values hold | H0 Not execute H1 Execute | | | | | | | | | | | | | | | | |
| 11-8 | Disconnection detection | H0 Not execute H1 Execute | | | | | | | | | | | | | | | | |
| 15-12 | Disconnection detection reset | H0 Auto (Auto reset for reconnection) H1 Manual | | | | | | | | | | | | | | | | |
| UM 00084 UM 00094 UM 000A4 UM 000B4 UM 000C4 UM 000D4 UM 000E4 UM 000F4 | Averaging constant | K200 | <div>Set constants for average processing.</div> <table><tr><th>Function used</th><th>Settings</th></tr><tr><td>No. of averaging times</td><td>No. of averaging times 2 to 60000 [times]</td></tr><tr><td>Time average</td><td>Average time 200 to 60000 [ms]</td></tr><tr><td>Moving average</td><td>No. of moving average 2 to 2000 [times]</td></tr></table> | Function used | Settings | No. of averaging times | No. of averaging times 2 to 60000 [times] | Time average | Average time 200 to 60000 [ms] | Moving average | No. of moving average 2 to 2000 [times] | | | | | | | |
| Function used | Settings | | | | | | | | | | | | | | | | | |
| No. of averaging times | No. of averaging times 2 to 60000 [times] | | | | | | | | | | | | | | | | | |
| Time average | Average time 200 to 60000 [ms] | | | | | | | | | | | | | | | | | |
| Moving average | No. of moving average 2 to 2000 [times] | | | | | | | | | | | | | | | | | |
| UM 00085 UM 00095 UM 000A5 UM 000B5 UM 000C5 UM 000D5 UM 000E5 UM 000F5 | Offset value | K0 | <div>Set an offset value at the time of using the offset processing function.</div> <div>Setting range: -3000 to +3000 (specified with a signed integer)</div> | | | | | | | | | | | | | | | |
| UM 00086 UM 00096 UM 000A6 UM 000B6 UM 000C6 UM 000D6 UM 000E6 UM 000F6 | Gain value | K10000 | <div>Set an offset value at the time of using the offset processing function.</div> <div>Setting range: +9000 to +11000 (0.9x to 1.1x: Specified with a signed integer)</div> | | | | | | | | | | | | | | | |

(Note) The unit memory numbers in the above table are listed for CH0 to CH7 in numerical order.

■ Individual setting area per channel

| Unit memory No. (Hex) | Name | Default | Setting range and description |
|--|-------------------------------------|---------|--|
| UM 00087 UM 00097 UM 000A7 UM 000B7 UM 000C7 UM 000D7 UM 000E7 UM 000F7 | Scale conversion Max. value | K10000 | Set the maximum value at the time of using the scale conversion function. Setting range: -3000 to +30000 (specified with a signed integer) |
| UM 00088 UM 00098 UM 000A8 UM 000B8 UM 000C8 UM 000D8 UM 000E8 UM 000F8 | Scale conversion Min. value | K0 | Set the minimum value at the time of using the scale conversion function. Setting range: -3000 to +30000 (specified with a signed integer) |
| UM 00089 UM 00099 UM 000A9 UM 000B9 UM 000C9 UM 000D9 UM 000E9 UM 000F9 | Upper limit comparison ON level | K1000 | Set the upper limit to turn ON the output flag at the time of using the upper/lower limit comparison function. Setting range: -31250 to +31250 (specified with a signed integer) |
| UM 0008A UM 0009A UM 000AA UM 000BA UM 000CA UM 000DA UM 000EA UM 000FA | Upper limit comparison OFF level | K1000 | Set the upper limit to turn OFF the output flag at the time of using the upper/lower limit comparison function. Setting range: -31250 to +31250 (specified with a signed integer) |
| UM 0008B UM 0009B UM 000AB UM 000BB UM 000CB UM 000DB UM 000EB UM 000FB | Lower limit comparison OFF level | K0 | Set the lower limit to turn OFF the output flag at the time of using the upper/lower limit comparison function. Setting range: -31250 to +31250 (specified with a signed integer) |
| UM 0008C UM 0009C UM 000AC UM 000BC UM 000CC UM 000DC UM 000EC UM 000FC | Lower limit comparison ON level | K0 | Set the lower limit to turn ON the output flag at the time of using the upper/lower limit comparison function. Setting range: -31250 to +31250 (specified with a signed integer) |

(Note) The unit memory numbers in the above table are listed for CH0 to CH7 in numerical order.

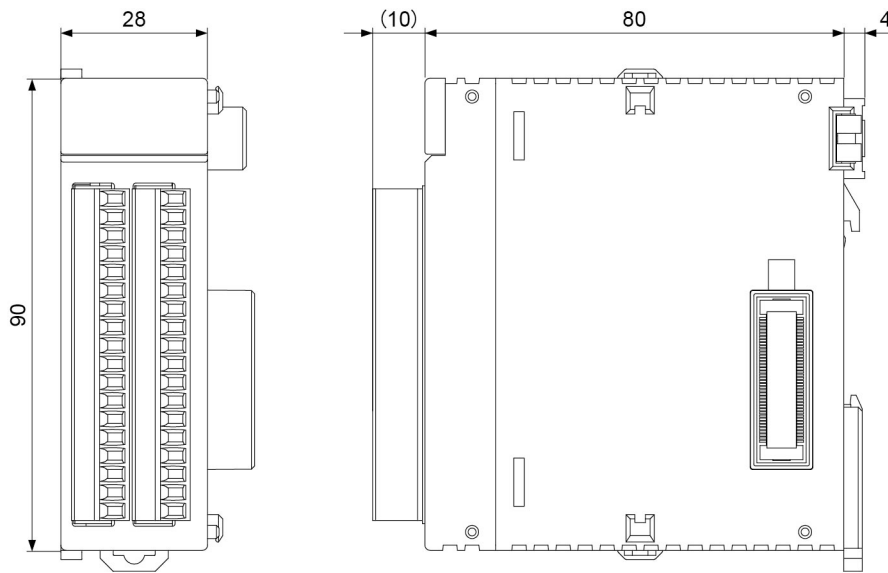
Specifications

■ Individual monitor area per channel

| Unit memory No. (Hex) | Name | Default | Data range and description |
|--|-----------------------|---------|--|
| UM 00170 UM 00171 UM 00172 UM 00173 UM 00174 UM 00175 UM 00176 UM 00177 | Holding max. value | K0 | The acquired maximum value will be held when the maximum and minimum value hold function is used. Setting range: -31250 to +31250 (specified with a signed integer) |
| UM 00178 UM 00179 UM 0017A UM 0017B UM 0017C UM 0017D UM 0017E UM 0017F | Holding min. value | K0 | The acquired maximum value will be held when the maximum and minimum value hold function is used. Setting range: -31250 to +31250 (specified with a signed integer) |

(Note) The unit memory numbers in the above table are listed for CH0 to CH7 in numerical order.

8.5 Dimensions



Unit: mm

Record of changes

| Manual No. | Date | Record of Changes |
|------------------|----------|-------------------|
| WUME-FP7TCRTD-01 | May 2014 | First Edition |

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